UI

09/19/2019

Gary Trombly, Jr.
Department of Energy and Environmental Protection
Storage Tank and PCB Enforcement Unit
79 Elm Street
Hartford, Connecticut 06106

Craig Bobrowiecki
Department of Energy and Environmental Protection
Remediation Division
79 Elm Street
Hartford, Connecticut 06106

Re: Partial Consent Order #COWSPCB 15-001
Partial Soil Remedial Action Plan
English Station
510 & 510A Grand Avenue
New Haven, Connecticut

Dear Messrs. Trombly and Bobrowiecki:

On September 6, 2018, The United Illuminating Company (UI) submitted to the Connecticut Department of Energy and Environmental Protection (CTDEEP or "the Department") the document entitled the "Partial Soil Remedial Action Plan". In early March 2019, the CTDEEP requested that a Soil Remediation Alternatives Analysis (SRAA) for Non-PCB soils be provided to the CTDEEP in accordance with Section B.1.e.4. of the referenced Partial Consent Order (PCO). The initial SRAA was prepared by TRC Environmental and received by the CTDEEP on March 22, 2019. Comment letters identifying deficiencies and requesting clarifications were submitted by the CTDEEP to UI on April 24, 2019 and June 12, 2019. Responses to CTDEEP comments were provided by UI on June 11, 2019 and June 26, 2019, respectively. Within the June 26, 2019 SRAA correspondence, UI outlined 6 soil remedial alternatives (4 identified by UI and 2 alternatives specified by the CTDEEP), a description of suitable fill to render polluted soil inaccessible and the associated cost to implement each remedy. On July 1, 2019 the CTDEEP issued Conditional Approval for the Partial Soil Remedial Action Plan based upon the clarifications provided in the June 20, 2019 SRAA Correspondence, stating that the document fulfills the requirements of B.1.e.4 as it relates only to the soil remedies proposed and is hereby approved subject to the following conditions:

(1) Of the six soil remedial alternatives presented, Alternative 2 listed in the SRAA shall be the chosen soil remedy at a cost that shall not exceed $6,977,327.50. Those costs are to address soils on Parcel A and Parcel B and do not include

those soil remediation costs associated with sub slab soils beneath the first-floor slab main power plant building on Parcel B.

(2) Suitable fill listed as non-polluted soil shall be free of asphalt fragments in addition to the general properties of that soil listed in the SRAA.

(3) Suitable fill listed as Natural Soil shall conform to the definition of Natural Soil as defined by the CTDEEP Solid Waste Regulations Section 22a-209-1, *"Natural Soil" means soil in which all substances naturally occurring therein are presented in concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable. For the purpose of this definition, substance shall have the same meaning as in section 22a-133k-l of the Regulations of Connecticut State Agencies.*

The following sections have been amended in the September 6, 2018 Partial Soil Remedial Action Plan in accordance with the Conditional Approval issued by the CTDEEP on July 1, 2019 and are contained in the attached current revised Partial Soil Remedial Action Plan dated August 2019:

a) **FIGURE 6 – PARCEL A AND NORTH SIDE PARCEL B REMEDIATION AREAS and FIGURE 7 SOUTH SIDE PARCEL B REMEDIATION AREAS, dated July 2018, with current revision date August 2019.** This drawing has been revised to provide grading of four (4) feet of suitable soil being placed to render underlying polluted soil exceeding the Industrial/Commercial Direct Exposure Criteria (I/C DEC) of the Connecticut Remediation Standard Regulations (RSRs) as "Inaccessible Soil", in accordance with Alternative 2 in the SRAA. The revised grading plan anticipates the underlying polluted soil will be shaped such that when four (4) feet of suitable soil fill is placed directly above, it will result in the proposed finished grades shown on the revised Figure 6, which is the top surface of the four-foot thick suitable soil layer. The top surface of the suitable soil layer will be graded at 2% from the center to the edges to promote proper surface drainage and prevent rainfall ponding.

b) **Section 3.1 - Remedial Objectives and Approach of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:**

3.1 Remedial Objectives and Approach

Remediation of PCB impacts will be completed and confirmed through the collection of confirmation samples in all areas to be remediated for other COCs at the Site. Following the remediation of PCBs, the approach of the proposed remedial action for other COCs is:

- In areas where grades are to be maintained at current elevations, soil will be excavated to depths such that the impacted soil beneath will be rendered inaccessible following site restoration.
- Excavated soil from excavations performed to address other COCs will ~~either~~ be
  - Transported offsite for appropriate disposal. ~~or~~

~~o Place beneath the soil cap within the area on Parcel A where surface grades will be elevated.~~

- To maintain the asphalt paving and soil barriers in perpetuity, an environmental land use restriction (ELUR) will be applied to the barrier ~~cap~~ areas. The ELUR will also restrict future site use to industrial/commercial use.
- ~~Construction of the barriers~~ Barrier placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement will render soil exceeding the I/C DEC ~~inaccessible~~ as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32) (A) and (B). These barriers will be constructed over nearly all of Parcel A and the northern portion of Parcel B. Barriers will also be constructed over large portions of Parcel B.
- Petroleum impacts to soil that are likely from releases due to Site operations will also be rendered inaccessible. When the petroleum impacts are found above the seasonal high water, which is approximately three feet below the ground surface over much of the Site, and analytical results indicate that the GB PMC is also exceeded, additional excavation will be performed.

These remedial objectives will be achieved by the following approach detailed further in this report. The elements of the overall approach to remediation of soils at the Site include:

- Preparation of remedial plans and permits;
- Site preparation and establishment of temporary facilities, including Site security, signage and erosion and sedimentation controls;
- Excavation and off-Site disposal of ~~excess~~ non-PCB-impacted soil;
- Collection of verification soil samples for non-PCB-impacted soil, analysis to confirm the limits of soil remediation;
- Preparation of sub-grade by shaping the Site soils to provide a 2% grade for surface drainage ~~and on-Site relocation of soils in areas of capping~~:
- Construction of soil and soil/asphalt barriers to render soils inaccessible; and
- Final restoration of soil excavation areas.

This remedial plan focuses on the remediation of non-PCB-impacted areas only.

c) **Section 3.4.6 – Remediation Sequencing of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:**

3.4.6 Remediation Sequencing

Non-PCB work will proceed after the PCB-related RAP is completed. The non-PCB remediation work will be sequenced as follows:

a) Permitting and submittals;

b) Installation/repair of construction fencing, wind screens, signage, and erosion controls;
c) Temporary water, and if needed electric, utility service;
d) Dust controls and monitoring;
e) Debris removal and clearing and grubbing;
f) Excavation of non-PCB impacted soil with proper off-Site transport and disposal ~~or on-Site relocation~~;
g) Subgrade shaping of polluted soils being rendered as "Inaccessible Soil";
h) ~~Creation of asphalt and soil barriers~~ Render polluted soil exceeding the IC/DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32) (A) and (B) by placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement;
i)~~h)~~ Site restoration and demobilization; and
j)~~i)~~ Implementation of deed restriction (ELUR).

d) Section 3.5 – Soil Excavation of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:

3.5 Soil Excavation

The remedial approach includes construction of soil and soil/asphalt barriers as described in Section 3.9. To achieve the proposed final elevations shaping of the surface of polluted soil to remain will be performed to promote drainage.~~,~~ ~~e~~Excess soils will be generated that will be impacted with non-PCB COCs. ~~Soils will also be generated for on-Site relocation under the proposed barriers.~~ All excess soil will be removed and disposed off-site.

The remedial contractor will characterize, transport and dispose of surplus soils at a permitted disposal receiving facility. Site soils requiring disposal will be accompanied with proper disposal documentation. Based on the excavation limits identified, remediation will require the removal of ~~20,000~~ 23,500 cubic yards of non-PCB impacted soil to meet the elevations for barrier construction ~~on-Site capping~~.

To achieve the proposed final barrier elevations, excavation will also occur ~~at the cap locations~~. The soil and soil/asphalt barriers ~~cap~~ will include excavation and surface shaping to achieve sub-grade conditions above which the demarcation layer and ~~soil cap~~ barriers will be constructed. In the soil/asphalt ~~cap~~ barrier areas, the surface asphalt layer will be milled and disposed of/recycled off-Site and no asphalt/bituminous paving fragments will be allowed to be used or incorporated into fill on the Site. The subgrade of the soil/asphalt barrier ~~cap~~ will be 27 inches below final grades. To achieve this cut, excavation will be performed of on-Site soils. Please refer to Section 3.9.3 and Section 3.9.5 for details of the construction of the soil barrier ~~and soil cap~~ and soil/asphalt barrier ~~cap~~, respectively.

e) Section 3.8 – On-Site Soil Relocation of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:

3.8 On-Site Soil Relocation

~~On-Site relocation of soils will be performed to prior to Site restoration and soil and asphalt cap construction. These relocated soils will be placed under the barriers. The sub-grade elevation of the relocated soils is calculated by subtracting the cap thickness, in feet, from the final grades. These relocated soils will be compacted to achieve long-term stability and limit future settling.~~ Relocation of non-PCB polluted soil will not be permitted. Shaping and grading of polluted soil being rendered as "Inaccessible Soil" will be performed to establish the subgrade elevations needed to place soil and soil/asphalt barriers to the grades shown on the drawings and promote surface drainage. Once compaction and sub-grade elevations have been achieved, the remedial contractor will begin Site restoration tasks detailed in the next section.

f) Section 3.9 Site Restoration

This section describes the remedial site contractor's Site restoration activities. These activities include installation of ~~cap~~ barrier components, backfilling excavations, and final surface restoration activities detailed below.

g) Section 3.9.2 – Backfilling Excavations of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:

3.9.2 Backfilling Excavations

~~Excavations will be backfilled with suitable backfill materials. Backfill will be tested at a frequency of one analytical sample per every 500 tons of material to be transported to the Site. Each sample will be tested for volatile organic chemicals (VOCs), semi-volatile organic chemicals (SVOCs), extractable total petroleum hydrocarbons (ETPH), pesticides, PCBs, and RSR-15 metals.~~

~~Backfill materials will be considered to be non-polluted (i.e., not impacted by a release) if organics (e.g., VOCs, SVOCs, ETPH, pesticides, PCBs) are not detected and metal concentrations are comparable to background concentrations determined for the State of Connecticut.~~

Suitable soil fill material is needed to render underlying polluted soil inaccessible with either 4-feet of suitable soil or 2-feet of suitable soil with 3-inches of bituminous concrete pavement. The following discussion provides a description of the soil materials that will be deemed acceptable and the methods that will be used to ensure quality control for these soil materials.

Excavated areas below the groundwater table will be backfilled with Non-Polluted Soil only as specified herein to the average groundwater table elevation (approximately elevation 4 +/- feet) or as required by the Engineer. Fill and backfill above the groundwater table will be with Non-Polluted Soil and Natural Soil. Other soil materials used in Site restoration (e.g., screened soil materials, topsoil, gravel, crushed stone) will meet the gradation requirements in the technical specifications and chemical concentrations specified for Non-Polluted Soil. If chemical concentrations for Non-Polluted Soil are not met, chemical concentrations for Permitted Beneficial Reuse Soil must be met and the Contractor must get approval for use of the material from CT DEEP.

The remediation contractor will be required to sample imported soil materials (i.e., Non-Polluted Soil, Natural Soil and Permitted Beneficial Reuse Soil) and other soil materials to be used as specified in the Contract Documents (e.g., screened soil materials, topsoil, gravel, crushed stone.) that are proposed for use at the Site for chemical testing at a frequency of 1 sample per 500 cubic yards. Contractor will submit samples to an approved, independent laboratory certified by the Connecticut Department of Public Health for analysis for the following chemical parameters:

a. Petroleum hydrocarbons by the CT DEEP Extractable Total Petroleum Hydrocarbons (ETPH) Method;
b. Volatile organic compounds (VOCs) by EPA Method 8261;
c. Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
d. RSR 15 metals by EPA Methods 6010 and 7471;
e. Pesticides by EPA Method 8081; and
f. PCBs by EPA Method 8082 with soil extraction by EPA Method 3540.

All analytical testing procedures will conform to Connecticut's Reasonable Confidence Protocols (RCPs) and the contractor's consultant will perform a Data Quality Assessment/Data Usability Evaluation as per CTDEEP requirements.

3.9.2.1 Non-Polluted Soil:

General Properties
Non-Polluted Soil shall be granular, well-graded friable soil; free of sediment, asphalt fragments, rubbish, debris, wood, glass, concrete, metal, bricks, ice, snow, tree stumps, roots, clay, organic matter and any non-soil deleterious material; with 25 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or three (3) inches, whichever is smaller. Soil material acceptable for use shall be classified as GM, GC, SM or SC according to the Unified Soil Classification System and shall have a plasticity index of less than 10.

Chemical Properties
All soil materials must meet the following specifications for chemical concentrations to be classified as Non-Polluted Soil:

a. Soil defined as unconsolidated geologic material overlying bedrock, but not including sediment, and **not affected by a release of a substance**. A Release is defined as any discharge, spillage, uncontrolled loss, seepage, filtration, leakage, injection, escape, dumping, pumping, pouring, emitting, emptying, or disposal of a substance. A Substance is defined as an element, compound or material, which when added to air, water or soil or sediment may alter the physical, chemical, biological or characteristic of such air, water, soil or sediment. Sediment is defined as unconsolidated material occurring in a stream channel, estuarine waters, or marine waters. (Reference Connecticut Regulation of State Agencies 22a-133k-1(a) – Definitions)
b. No detectable concentrations of petroleum hydrocarbons as determined by CT DEEP ETPH Method with laboratory reporting limits less than the Analytical Detection Limit (ADL), Residential Direct Exposure Criteria (RDEC) and the GA PMC;
c. No detectable concentrations of VOCs by EPA Method 8260 with laboratory reporting limits less than the ADL, RDEC or the GA Pollutant Mobility Criteria (PMC) for each analyte;
d. No detectable concentrations of SVOCs by EPA Method 8270 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte;
e. Concentrations of RSR 15 metals by EPA Methods 6010 and 7471 less than the lower of the ADL, the High Range Background Concentration and the GA PMC by SPLP Method for each metal;
f. No detectable concentrations of pesticides by EPA Method 8081 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte; and
g. No detectable concentrations of PCBs by EPA Method 8082 with laboratory reporting limits less than the ADL, RDEC or the GA PMC by SPLP Method.
h. The RDEC is the Residential Criteria provided in Appendix A and the GA, GAA Mobility Criteria (GA PMC) provided in Appendix B of the Regulations of Connecticut State Agencies, Section 22a-133k-1 through -3, inclusive.
i. Soil will be analyzed for each analyte for which an RDEC and GA PMC is provided.

Background Metals Concentrations

Metal	High Range Background Concentration (mg/kg)
Antimony	ND
Arsenic	5.4
Barium	800
Beryllium	3.5
Cadmium	0.3
Chromium	8.5
Copper	93
Lead	32
Mercury	0.08
Nickel	40
Selenium	49
Silver	0.83
Thallium	1
Vanadium	157
Zinc	130

ND – Not detected above laboratory reporting limits.

Source: *Background concentrations for Connecticut Mesozoic Basin soils from Brown and Thomas, "Major and Trace Element Geochemistry and Background Concentrations for Soils in Connecticut," Northeastern Geoscience, Volume 32, 2014.*

3.9.2.2 Natural Soil:

Suitable fill listed as Natural Soil shall conform to the definition of Natural Soil as defined by the CTDEEP Solid Waste Regulations Section 22a-209-1, "Natural Soil" means soil in which all substances naturally occurring therein are presented in concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable. For the purpose of this definition, substance shall have the same meaning as in section 22a-133k-l of the Regulations of Connecticut State Agencies. Soil materials that do not meet the specifications for chemical concentrations to be classified as Non-Polluted Soil may be used onsite as Natural Soil as long as all of the metals conform to the following table that specifies the lower of the site background metals concentration and the RDEC. Metals must also conform to the GA PMC by SPLP

method. In addition, all of the other substances (non-natural) must comply with the requirements of Non-Polluted Soil.

Metal	Concentration (mg/kg)
Antimony	4
Arsenic	10
Barium	320
Beryllium	2.0
Cadmium	5
Chromium	72
Copper	760
Lead	400
Mercury	4
Nickel	70
Selenium	15
Silver	1
Thallium	5
Vanadium	390
Zinc	1,000

ND – Not detected above laboratory reporting limits.

Only non-polluted soil will be used to backfill excavations below the groundwater surface which is approximately four ft bgs. All backfill materials will be placed and compacted in one-foot lifts and compaction to 90% of the modified proctor density will be required.

h) Section 3.9.3 – Construction of Soil Barriers of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:

3.9.3 Construction of Soil Barriers

The area of soil barriers is depicted on Figures 6 and 7. The soil barrier ~~cap~~ will include four feet (48 inches) of tested and approved suitable soil above the orange demarcation layer and ~~"native"/relocated soils~~ the underlying shaped polluted soil being rendered as "Inaccessible Soil". The top six inches of the soil cap will be loam. This loam layer will be

seeded, and grass will be used to establish a vegetated turf layer. This turf, once established, will limit erosion.

The surface grade of the soil barrier ~~cap~~ will be graded to maintain a minimum of 12 inches ~~of freeboard above the~~ of exposed steel bulkhead at the edge of the island. In this way, the soil barrier ~~cap~~ will be fully contained within the steel bulkhead and not overtop the bulkhead. The four-foot thick soil barrier ~~cap~~ will render the covered underlying polluted soils "Inaccessible Soil" ~~inaccessible and eliminate the direct exposure pathway~~.

i) **Section 3.9.4 – Establishing Turf of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:**

3.9.4 Establishing Turf

As noted above, the soil barriers ~~cap~~ will be finished with a surface application of six inches of loam and seed to establish turf. Hydro-seeding of a seed mix suitable for the Connecticut climate will be applied to the surface loam layer of the soil barriers ~~cap~~. The turf root system will limit erosion of the soil barriers ~~cap~~. Please refer to Figures 6 and 7 for a graphical depiction of the soil barrier ~~cap~~ areas to be finished with turf.

j) **Section 3.9.5 – Paved Cap of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:**

3.9.5 ~~Paved Cap~~ Soil/Asphalt Barrier

The remedial contractor will construct ~~an~~ soil/asphalt barriers ~~cap~~ in areas shown on Figures 6 and 7. As noted in Section 3.5, existing paving will be milled, and this material transported off-Site for proper disposal/recycling. Existing polluted soils will then be excavated to 27 inches below final paved ~~cap~~ elevations. The soil/asphalt barrier ~~cap~~ will then consist of the orange demarcation layer overlain by 24 inches of compacted tested and approved suitable soil overlain ~~capped~~ with the 3 inches of pavement above. The 24 inches of soil will include approximately 15 inches of compacted sub-base overlain with 9 inches of compacted base material. The surface will include 3 inches of bituminous pavement. The soil/asphalt barrier ~~paved cap~~ will render the ~~covered~~ underlying polluted soils "Inaccessible Soil" ~~inaccessible~~.

k) **Section 3.12 – Post-Remediation Reporting of the Partial Soil Remedial Action Plan is being revised with strikethrough for deletions and underline for insertions as follows:**

3.12 Post-Remediation Reporting

The remediation oversight engineer will prepare a report to document the implementation of this Partial RAP. The RAR will include a summary of completed

remedial actions including volume of excess non- PCB-impacted soils and disposal documentation. The oversight engineer will summarize the confirmatory sampling activities and results. If expanded soil excavation activities were performed based on confirmatory sampling results, those details will be summarized in the RAR. The soil and soil/asphalt barrier ~~cap~~ construction will also be documented. The oversight engineer will also note, if present, significant deviations from the proposed final grades in the RAR report.

In accordance with Section B., 13 of the PCO, the undersigned have personally examined and are familiar with the information submitted in this document and all attachments thereto, and do certify, based on reasonable investigation, including their inquiry of those individuals responsible for obtaining the information, that the submitted information is true, accurate and complete to the best of their knowledge and belief. They understand that any false statement made in the submitted information is punishable as a criminal offense under §53a-157b of the Connecticut General Statutes and any other applicable law.

Should you have any questions or comments regarding this document or any attachments hereto, please don't hesitate to contact Shawn Crosbie at (860) 904-8551.

UNITED ILLUMINATING COMPANY

Anthony Marone
President and Chief Executive Officer
United Illuminating Company

Shawn Crosbie
Project Manager
United Illuminating Company

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

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DISAPPROVAL

September 13, 2019

VIA EMAIL AND CERTIFIED MAIL
Mr. Shawn Crosbie
United Illuminating Company
180 Marsh Hill Road
Orange, CT 06477

RE: Disapproval of Remedial Action Plans

Dear Mr. Crosbie:

For the reasons set forth in this letter, the Storage Tank & PCB Enforcement Unit of the Emergency Response and Spill Prevention Division of the Bureau of Materials Management and Compliance Assurance (BMMCA) has reviewed and is disapproving two documents prepared for United Illuminating Company ("UI") by Weston and Sampson regarding Partial Consent Order # COWSPCB 15-001 ("PCO"). The first document is entitled, *English Station Partial Soil Remedial Action Plan* ("the Partial Soil Plan") and the second is entitled *English Station Parcel A PCB Remedial Action Plan* ("the PCB Plan"). Both concern implementation of certain remedial actions at Parcel A.

The PCB Plan was submitted to the DEEP employee identified under paragraph B.22 of the PCO on November 2, 2018. The Partial Soil Plan was submitted electronically on November 6, 2018 and hard copy on March 22, 2019. Unfortunately, both documents were submitted prematurely; both addressed UI's preferred remediation approach without UI having first submitted an evaluation of the potential remedial alternatives, as required by paragraph B.1.e.4 of the PCO.

On March 19, 2019, after being reminded by the Department that an evaluation of the remedial alternatives was required by paragraph B.1.e.4 of the PCO, UI submitted an evaluation entitled a *Soil Remedial Alternative Analysis* ("SRAA") with the intent to support the selection of the proposed remedial alternative in both the Partial Soil Plan and the PCB Plan. On July 1, 2019, the Department conditionally approved the SRAA and selected a remedial alternative. Significantly, the remedial alternative approved by the Department is different from UI's preferred alternative and as such the remedial alternative approved by the Department is neither discussed nor addressed in the Partial Soil Plan and the PCB Plan. Accordingly, pursuant to paragraphs B.1.e and B.10 of the PCO, both plans are hereby disapproved.

In addition, pursuant to paragraphs B.1.e and B.10 of the PCO, within forty-five (45)

days of this letter UI is hereby directed to submit to the Department, attention Gary Trombly, a detailed program and schedule, meeting the requirements of the PCO, and to submit Remedial Action Plans (RAPs) that recognizes and provides a detailed program and schedule for the implementation of the remedial alternative approved by the Department in its July 1, 2019 letter.

Nothing in this disapproval shall affect the Commissioner's authority to institute any proceeding, or take any other action to prevent or abate pollution, to recover costs and natural resource damages, and to impose penalties for violations of law including but not limited to violations of any permit issued by the Commissioner. The Commissioner may institute any proceeding, or take any action to require further investigation and further action to prevent or abate pollution.

In addition, nothing in this determination shall relieve any person of his or her obligations under applicable federal, state and local law.

No provision of this disapproval and no action or inaction by the Commissioner shall be construed to constitute an assurance by the Commissioner that the actions taken pursuant to this disapproval will result in compliance.

If you have any questions pertaining to this matter, please contact Gary Trombly at (860) 424-3486.

Sincerely,

Peter Zack
Director
Emergency Response & Spill Prevention Division
Bureau of Materials Management & Compliance Assurance

cc: Kimberly Tisa, US EPA R1 PCB Coordinator

Sent Certified Mail #
Return Receipt Requested

DEEP
Carlos Guzman
79 ELM ST

HARTFORD CT 06106

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United Illuminating Company
Mr. Shawn Crosbie
180 Marsh Hill Road

Orange CT 06477

English Station Construction Schedule

smartsheet

	Task Name	FY 2019												FY 2020					
		January 2019	February 2019	March 2019	April 2019	May 2019	June 2019	July 2019	August 2019	September 2019	October 2019	November 2019	December 2019	January 2020	February 2020	March 2020	April 2020	May 2020	Ju
1	Project Tasks																		
4	WSA Construction										Not Started								
6	Install Access Driveway										Not Started								
8	Clearing &Grubbing				Complete														
10	Permitting and Submitals																		
15	Utility Disconnect																		
17	Pre-Excavation Limit/Verification																		
19	Install Decontamination Pads																		
21	Traffic Control																		
23	Abatement of small building (Assembly Hall, Contractors office, Gaurd shed,Chor bldg)																		
25	Phase 1																		
26	Misc. Tasks in Preparation of Phase 1																		
27	Demolition and Management of Auxilary Buildings, Chlorination Tower, Guard Shack, Assenbly Hall/Swordfish and Contractors Buidlings and sent off site as remediation waste																		
28	Installation of Shoring																		
29	Abandon Manhole and Connecting Pipes																		
30	Abandon Septic Tank, Manhole Sump, Catch Basin and Connecting pipes																		
31	De-Chlorination tower Demoliton and																		
32	Pump out of PCB Oils from Manholes and Trenches																		
33	Transformers to be relocated to a location determined by United Illuminating																		
34	Abandon Below Grade Structures per the Specifications																		
35	Sampling of Misc. Debris Piles																		
36	Management of Debris Piles																		
37	Abatement of Below Ground Pipe Trench (AST Pipe Trench and Boiler 13 Discharge)																		
38	Subpart O Verification samples (horizontal)/Excavation shoring limits																		
39	Installation of Shoring																		
40	Phase 1 Excavation																		
41	Groundwater Management - TBD																		
42	Air Monitoring and Dust Control																		
43	Excavation of Soils >50 PCB Soils																		
44	Transportation and Disposal of >50 PPM PCB Soils																		
45	Excavation of <50 PCB areas																		
46	Transportation and Disposal of <50 PPM PCB Soils																		
47	Excavation of other AOC's																		
48	Transportation and Disposal of other AOC materials																		
49	Phase 2																		
50	Misc. Tasks in Preparation of Phase 2																		
51	Protection of Monitoring Wells																		
52	Abandon vault and connecting pipes																		
53	Sampling of Debris Piles																		
54	Management of Debris Piles																		
55	Subpart O Verification Sampling (Horizontal)/Shoring TBD																		
56	Phase 2 Excavation																		
57	Groundwater Management - TBD																		
58	Air Monitoring and Dust Control																		

Exported on September 23, 2019 11:06:00 AM EDT

	Task Name	FY 2019																		
		January 2019	February 2019	March 2019	April 2019	May 2019	June 2019	July 2019	August 2019	September 2019	October 2019	November 2019	December 2019	January 2020	February 2020	March 2020	April 2020	May 2020	Ju	
59	Excavation of >50 PPM PCB's Soils												Not Started							
60	Transportation and Disposal of >50 PPM PCB Soils												Not Started							
61	Excavation of <50 PPM PCB Soils													Not Started						
62	Transportation of Disposal of <50 PCB Soils													Not Started						
63	Backfill of Excavation Areas														Not Started					
64	**Phase 3**													Not Started						
65	**Misc. Tasks in Preparation of Phase 3**													In Progress						
66	Metal Frame Demo										Not Started									
67	Protect monitoring wells												Not Started							
68	Commence work on permanent storm water infrastructure													Not Started						
69	Abandon catch basin and connecting pipes per specification													Not Started						
70	Perforate HDPE Liner											Not Started								
71	**Phase 3 Excavation**													Not Started						
72	Per Approved RAP, sample misc. debris piles										Not Started									
73	Manage Misc. Debris Piles										Not Started									
74	Subpart O Verification Sampling (horizontal)/defining shoring extent											Not Started								
75	Installation of Shoring													Not Started						
76	Groundwater Management TBD																			
77	Air Monitoring and Dust Control												Not Started							
78	Excavation of <50 PCB areas												Not Started							
79	Transportation and Disposal of <50 PPM PCB Soils												Not Started							
80	Excavation of >50 PPM PCB areas											Not Started								
81	Transportation and Disposal of >50 PPM PCB Soils											Not Started								
82	Excavation of other AOC's areas												Not Started							
83	Verification sampling												Not Started							
84	Backfilling of excavation areas												Not Started							
85	Install Guardrail													Not Started						
86	Cooling Water Tunnel Abandonment												Not Started							
87	**Grading of Site for Installation of Barrier**												Not Started							
89	**Paving Prep and Paving**																		Not Started	
91	**Completion of Barrier**																		Not Started	
93	**Site Clean Up**														Not Started					
95	**Air Monitoring & Dust Control**													In Progress						
97	**Sediment and Erosion Controls**													In Progress						
100	**Demobilization**														Not Started					
102	**Prepare and submit Remedial Action Report to DEEP-Soil**													Not Started						
104	**Demo-Station B**																			
116	**Fence and Guardrail**																			
117	Site Elevation and Survey																		In Progress	
118	ASSUMPTIONS																			
119	*All dates above are contingent on RAP Approval																			

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REPORT

September 2018
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United Illuminating

English Station Partial Soil Remedial Action Plan

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

Weston & Sampson, on behalf of United Illuminating (UI), has prepared this Partial Remedial Action Plan (RAP) for the English Station property located at 510 and 510A Grand Avenue in New Haven, Connecticut (the Site). UI proposes to remediate soil at the Site as required under the Partial Consent Order (PCO - COWSPCB15-001) issued by the Connecticut Department of Energy and Environmental Protection (CT DEEP).

This Partial RAP presents the plans and procedures to be implemented for the remediation of soil containing Chemicals of Concern (COCs) other than polychlorinated biphenyls (PCBs) at the Site. However, the English Station Building and the large transformer at the northwest corner of the building are outside the limits of work for this partial RAP. The soil beneath the building and transformer will be remediated under a separate RAP. Thus, this remedial plan is partial in that it does not include the entire site. Remediation of PCBs in soil are being addressed under separate remedial plans (English Station Parcel A PCB Soil Remedial Action Plan and Parcel B PCB Soil Remedial Action Plan, Weston & Sampson, August 2019). PCB remedial actions will be completed within each remediation area prior to the implementation of this RAP.

The Site occupies approximately 9-acres of land located south of Grand Avenue in the City of New Haven. The Mill River borders the Site to the east, west, and south. UI operated electrical generating facilities on the property between 1929 and 1992. The Site location, surrounding area, and significant Site features are depicted on Figures 1 and 2.

Historically, the Site was constructed using dredged sediments as described in the "Request for Widespread Polluted Fill Variance," Advanced Environmental Interface, January 10, 2003. The variance was approved for the Site by the CT DEEP in a letter dated March 27, 2003.

Between July and September 2017, Weston & Sampson performed investigations to evaluate soil, groundwater, and porous media (concrete, wood, and asphalt) conditions. The analytical data generated during these Site investigations and other historical investigations has been used to develop the remedial actions described in this plan.

The COCs at the Site being addressed under this RAP include metals, primarily arsenic, extractable total petroleum hydrocarbons (ETPH), and the Semivolatile Organic Compounds (SVOCs) known as polyaromatic hydrocarbons (PAHs). Analytical testing was done at the Site for Volatile Organic Compounds (VOCs) and other SVOCs but remediation for these chemicals is not required based on the lack of evidence of releases to the subsurface as determined through the investigative process.

As noted above, the design for remediation of PCBs in soil is discussed in two separate RAPs. Remedial work at the Site will be phased such that PCBs remediations are completed prior to remediation of other COCs.

The remedial goals for the COCs at the Site as identified above that are germane to this RAP:

- Include rendering soil exceeding the Industrial/Commercial Direct Exposure Criteria (I/C DEC) inaccessible by constructing barriers consisting of an orange demarcation layer and either four

(4) feet of soil completed with grass or two (2) feet of backfill completed with three (3) inches of bituminous concrete;

- Assume that an Industrial/Commercial Environmental Land Use Restriction (ELUR) will be placed on the Site and that residential criteria will not be applicable; and
- Take into account that, for the Pollutant Mobility Criteria, the widespread polluted fill variance provides for compliance with these criteria unless the impacts are due to a release from Site operations after the fill was placed. No soils impacted by releases from site operations with COCs exceeding the GB PMC were identified.

This non-PCB RAP describes the measures to be implemented to achieve these remedial objectives.

This RAP includes the use of Environmental Land Use Restrictions (ELURs) to achieve remedial goals as well. The current and any future owners are obligated, in accordance with Consent Order COWSPCB 16-001, to comply with any and all ELURs recorded on the land records.

1.0 INTRODUCTION

Weston & Sampson, on behalf of United Illuminating (UI), has prepared this Partial Remedial Action Plan (RAP) for the English Station facility, a former electric power plant located at 510 and 510A Grand Avenue, New Haven, Connecticut (the Site). This RAP presents the plans and procedures to be implemented for the remediation of soil containing Chemicals of Concern (COCs) other than polychlorinated biphenyls (PCBs) at the Site. Remediation of PCBs are being addressed under separate remedial plans (Parcel A and Parcel B) that will be implemented prior to this non-PCB RAP. UI proposes to remediate the Site as required under the Partial Consent Order (PCO COWSPCB15-001) issued by the Connecticut Department of Energy and Environmental Protection (CT DEEP).

The English Station Building and the large transformer at the northwest corner of the building are outside the limits of work for this partial RAP. The soil beneath the building and transformer will be remediated under a separate RAP. Thus, this remedial plan is partial in that it does not include the entire site.

1.1 Site Location & Description

The Site consists of 9-acres of land located on a man-made island (Ball Island) situated within the Mill River which Flows north to south into the Long Island Sound. The Site has been split into two parcels (Parcel A and Parcel B), which are owned by two separate entities. The island is retained via steel bulkhead which surrounds the Site to the east, west, and south. The Site location is shown in Figure 1 – Locus Map. Geographic coordinates for the Site are:

Latitude/Longitude:	41° 18’ 23" North/72° 54’ 24" West
UTM Coordinates:	Zone 18 675,239.9 meters Northing 4,574,883.6 meters Easting

The north side of the Site as depicted on the figures, which includes Parcel A and the north side of Parcel B, consists of an area of approximately 3.6 acres. This portion of the Site is developed with a two-story former electrical generating plant, referred to as Station B. In addition to Station B, the north side of the Site also includes former locations of concern including the coal bin storage area, a storm water surge basin, cable houses, and a subsurface cooling water tunnel which formerly discharged water from Station B to the Mill River.

The south side of the Site as depicted on the figures, which includes the south side of Parcel B, consists of the remaining 5.3 acres of land located at the southern tip of Ball Island. Several structures currently stand within this portion of the Site, including the former English Station power generating plant. Of the 5.3 acres of land in the southern side of the Site, the former power plant foundation encompasses approximately 2.3 acres. Other buildings within this portion of the Site include a former assembly hall, storage building, and a foam house.

1.2 Site Background

The Site was first occupied by Enos S. Kimberly and Company in the late 1880s and was utilized as a coal and lumber facility. In 1890, New Haven Electric Company purchased the Site and began the

construction of Station B. As part of this construction, Ball Island's footprint was expanded via the filling of the portion of the Mill River south of the Site. Station B reportedly operated as a coal-fired power plant until 1903.

UI purchased the property in 1914 and began the construction of the English Station Power Plant in 1924. The initial construction consisted of coal-fired, low-pressure boiler and turbine areas, which were completed in 1929. Sometime between 1948 and 1952, two additional coal fired, high-pressure boilers and turbines were constructed at the southern end of English Station. At that time, Ball Island was further expanded to the South by the additional filling of the Mill River. The English Station Power plant operated as a coal-fired power plant until sometime in the mid-1950s when the plant was converted into an oil-fired plant. English Station then operated as an oil-fired plant until 1992 when it was placed on deactivated reserve status. In an attempt to preserve interior building conditions, several gas-fired boilers, temperature and humidity controls were installed.

In 2000, UI transferred the Site to Quinnipiac Energy, LLC (QE). At that time, an escrow of $1,900,000 was established by UI to support environmental investigation and cleanup of the Site. From 2000 through 2008, Advanced Environmental Interface, Inc. (AEI) performed environmental assessment activities on behalf of QE. Assessment activities were ceased in 2008, when the escrow funds were depleted. In 2006, prior to depleting the escrow funds, QE filed for bankruptcy and divided the property into two parcels (Parcel A and Parcel B). Subsequently, QE sold Parcel A to Evergreen Power, LLC (Evergreen) and Parcel B to ASNAT, LLC (ASNAT). Parcel A was recently sold to Haven River Properties and Parcel B was sold to Paramount View Millennium LLC.

In 2011, the Site owners at the time (ASNAT and Evergreen) contracted Grant Mackay Company (Grant Mackay) and Classic Environmental, Inc. (Classic Environmental) to demolish the existing on-Site structures with the intention of generating enough money through selling scrap-metal steel to fund the future environmental investigation and eventual cleanup of the Site. The initial focus of this project was at the main English Station power plant building. In 2012, CT DEEP conducted an on-Site inspection which concluded that there was potential for tracking and spreading PCB contamination from source areas to other uncontaminated areas of the Site. In February 2012, CT DEEP issued a Cease and Desist Order (CDOWSUST 12-001) which terminated all on-Site activities. The United States Coast Guard (USCG), issued an Administrative Order, 002-14, on September 19, 2012 to the new Site Owners and to UI as the former Site owner. Actions performed by the USCG included placing booms around the southern end of Ball Island and removal of liquid wastes and drummed materials from the Oil Room because of the potential to discharge to a nearby catch basin.

In July 2017, Weston & Sampson was granted Site access to observe current on-Site conditions. The Site is primarily improved with decaying impervious surfaces (asphalt and concrete), as evident by vegetation growth throughout the Site. Brushy vegetation had been allowed to grow in some areas of the Site and was removed from above the ground surface without disturbing underlying soils/roots to allow access to areas of the Site for the purposes of inspection and carrying out an environmental investigation exterior to the buildings.

1.3 Site Geology and Hydrogeology

1.3.1 Geology

According to the "Surficial Materials Map of the Connecticut," (Stone et al., 1992), the Site is located in an area underlain by fill. The 1998 Phase II/III report by GEI Consultants, Inc., indicates the fill material encountered during their investigation of the Site ranged in thickness from 9 to 16.5 feet and consisted of a variety of granular materials, including loose, poorly sorted sands and silt with fill materials including brick, ash, cinders, wood, glass metal, and plastic fragments.

Per GEI Consultants, Inc., a slightly plastic silt and fine sand layer was encountered beneath the fill layer and generally ranged in thickness from 5 to 11 feet. Numerous mollusk shells, fine roots, and other organic materials were observed in this layer. Occasional 1- to 3- inch thick layers of well-sorted and sub-rounded fine to medium sands were observed interbedded with the siltier portions of this strata. Interbedded fine to medium sand and slightly plastic silts were observed beneath the potential confining layer of slightly plastic silts.

According to the "Bedrock Geological Map of the Connecticut," (Rodgers, 1985), the bedrock beneath the Site consists of New Haven Arkose. This bedrock is described as consisting of reddish, poorly-sorted, coarse-grained, sandstone-like sedimentary rock.

1.3.2 Groundwater

Groundwater at the Site is classified as GB by the CT DEEP, indicating that it is not suitable for human consumption without treatment. Based on previous Site investigations, groundwater is generally observed in shallow overburden fill materials between approximately 3 and 5 feet below ground surface.

Water level measurements indicated that groundwater at the Site is tidally influenced with an approximately 0.5 to 1.0-foot fluctuation between high and low tidal cycles. Groundwater flows at low tide are typically towards the bulkhead. Groundwater flow at high tide depends upon the level of groundwater at the site which can be influenced by recent precipitation.

1.4 Applicable Regulations

Applicable Regulations for the Site remediation for COCs other than PCBs are the Connecticut Remediation Standard Regulation (RSRs) found in the Regulations of Connecticut State Agencies (RCSA), Section 22a-133k-1 through 3, inclusive. It is anticipated that an industrial/commercial (I/C) Environmental Land Use Restriction (ELUR) will be placed on the property in accordance to the requirements of 22a-133q-1 of the RCSA. As such, remediation will be performed to comply with the I/C Direct Exposure Criteria (DEC).

A Widespread Polluted Fill Variance was granted for the Site. Thus, remediation will not be performed to comply with the GB Pollutant Mobility Criteria (PMC) unless it is determined that the COCs present within an AOC are due to a release from Site operations and not from the historical placement of polluted fill.

1.5 ELUR Obligations

This RAP includes the use of Environmental Land Use Restrictions (ELURs) to achieve remedial goals as well. The current and any future owners are obligated, in accordance with Consent Order COWSPCB 16-001, to comply with any and all ELURs recorded on the land records.

2.0 SUMMARY OF SITE INVESTIGATIONS

Several Site investigations have been performed to evaluate the nature and extent of contamination at the Site. This section provides a summary of the investigation activities conducted to characterize the presence of non-PCB COCs. As noted in Section 1.2, soil containing extractable total petroleum hydrocarbons (ETPH), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), and metals has been identified at the Site. Details regarding Site investigation activities and the remedial strategy to address PCBs are provided in separate RAPs for Parcel A and Parcel B.

2.1 2017 Site Investigation

In 2017, Weston & Sampson performed an environmental site assessment as per the TRC Scope of Study dated July 2017. Samples were collected of soil, sediments, porous materials, and tested for PCBs, ETPH, SVOCs, VOCs, and metals. The data from this investigation for all analytical parameters except for PCBs are presented in Tables 1 through 14.

2.2 Historical Site Investigations

The following text is modified text from the TRC Scope of Study dated July 2017. This summary of environmental work was prepared by TRC and condensed by Weston & Sampson to reflect non-PCB historical assessments only relevant to this PARTIAL RAP.

2.2.1 1998 Phase I Environmental Site Assessment, GEI Consultants, Inc. (GEI, 1998a)

In 1998, GEI completed a Phase I Environmental Site Assessment (ESA) on the Site for UI. GEI noted that a 50,000-gallon vertical aboveground storage tank (AST), reportedly used for the storage of No. 6 fuel oil, was observed on the southern portion of the Site, to the south of English Station. In addition to the vertical AST, GEI noted two 5,000-gallon horizontal ASTs, reportedly used for the storage of No. 2 fuel oil, in the same area. All three tanks were located within brick and concrete containment dikes. GEI did not observe stains or leaking associated with the tanks during their Site reconnaissance.

GEI noted the following equipment during their inspection of the Site that may contain non-PCB oils:

- Southern Portion of Coal Handling Area: Three capacitor banks were observed in this area: two of the capacitor banks were reportedly located in a single enclosure at one location; a single capacitor bank was observed in another enclosure; and a third enclosure was observed to be empty. Tags reportedly indicated “No PCBs.”
- Bulkhead, Western, Southern and Eastern Sides: Three cathodic protection relays were observed by GEI along the western, southern and eastern sides of the bulkhead.

In addition to the equipment noted above, GEI observed two tank trucks in the central portion of the former coal handling area that UI personnel reportedly noted contained transformer fluid from the large “G” transformer located at the northwest corner of English Station.

GEI made the following conclusions and identified the following areas of concern at the completion of the Phase I ESA (GEI, 1998a):

- Four underground storage tanks (USTs) were formerly located in an area adjacent to the west side of Station B. According to information obtained from CT DEEP files, two older, 2,000-gallon gasoline USTs were installed at this location and removed in June 1991, when they were both replaced by 1,000-gallon USTs. A CT DEEP spill report noted that a nominal petroleum sheen was observed on the water table during the tank removal, although groundwater samples did not exhibit contamination. The 1,000-gallon USTs were reportedly removed in October 1996 and limited soil and groundwater sampling conducted at that time did not reveal the presence of contaminants.
- A 1967 CT DEEP inspection report (P-5) indicated that the Site was served by six separate septic tanks and associated leaching fields. The report notes that one of the septic systems was noted on a UI Site plan, to the north of the coal conveyor system. The locations of the other septic systems were not indicated by GEI in their report.
- Spill reports on file with CT DEEP identified nineteen separate spills in connection with the Site. Of these spills, roughly half were releases to the Mill River. Several others involved spills or releases of PCB-containing oils to soil or other areas on-Site, but generally did not identify specific locations.
- A waste oil AST was formerly located adjacent to the southeastern corner of English Station.
- One 50,000-gallon No. 6 fuel oil and two 5,000-gallon No. 2 fuel oil ASTs were noted on the southern portion of the Site, adjacent to English Station.
- Several station transformers, large circuit breakers, capacitor banks, and cathodic protection relays were observed across the Site.
- Three former chemical storage areas were identified within English Station, though their exact locations were not described by GEI.
- A former industrial wastewater treatment system was located southeast of English Station. At the time of the 1998 Phase I, the system was no longer present, although GEI noted remnants of the former wastewater treatment system (concrete pads, etc.) present adjacent to the north of the high-pressure boiler discharge point.
- GEI noted that based on their review of historic maps, aerial photographs and other documentation, much of the Site appears to be underlain primarily by fill material of an unknown quality and origin.
- Coal storage operations at the Site, south of Station B, were conducted over an extended period.
- The Site was identified as a Large Quantity Generator (LQG) of hazardous wastes. GEI noted that the Site may be considered an "Establishment" under the Connecticut Property Transfer Act. A 1992 CT DEEP Hazardous Waste Generation Report indicates 13,315 pounds and 966 gallons of hazardous waste were generated during deactivation of the Plant in 1991/1992.

2.2.2 1998 Phase II/III Field Investigation, GEI Consultants, Inc. (GEI, 1998b)

In July 1998, GEI returned to the Site to perform a Phase II and partial Phase III investigation. The purpose of the investigation was to assess soil and groundwater conditions in the AOCs identified in their earlier (May 1998) Phase I. GEI identified the following AOCs for the Site related to non-PCB impacts:

- AOC 2: Station B USTs. Four gasoline USTs were formerly located to along the west side of Station B. Two older 2,000-gallon gasoline USTs were removed from this area in 1991 and

replaced with two 1,000-gallon gasoline USTs. The 1,000-gallon gasoline USTs were removed in 1996. Only limited sampling was completed in this area.

- AOC 3: Former Septic Systems. CT DEEP documentation indicated as many as six septic systems were previously in use at the Site. Only one septic tank was identified by GEI during their review of plans for the Site.
- AOC 4: Past Spills. Several spill reports reviewed by GEI indicated sheens and releases to the Mill River occurred via the storm sewer system on-Site.
- AOC 7: Waste Oil AST/Oil Pump House. A former waste oil AST was identified by GEI as having been located next to the southeastern corner of English Station. An oil pump house that served high-pressure boiler units 13 and 14 was also located in this area.
- AOC 8: Fuel Oil ASTs. One 50,000-gallon No. 6 fuel oil AST and two 5,000-gallon No. 2 fuel oil ASTs were identified on the southern portion of the Site. All three tanks were located within secondary containment dikes; however, GEI noted surficial soil staining outside of the bermed area.
- AOC 10: Former Interior Chemical Storage Areas. Three former chemical storage areas were identified within the Plant building.
- AOC 11: On-Site Fill Material. Historic information reviewed by GEI indicated that much of the Site is underlain by fill material of an unknown origin and quality.
- AOC 12: Coal Storage. The central portion of the Site, south of Station B and north of English Station, housed coal storage and handling operations for an estimated 40-year duration.
- AOC 13: Former Wastewater Treatment Facility. According to GEI, a former wastewater treatment system was in the southeastern corner of the Site. Remnants of the treatment system, including concrete pads and a below grade pumping station, were observed by GEI during the Phase I.

With respect to the documentation of past spills on the Site, AOC-4, GEI noted that many of the spill reports were for evidence of discharges to the Mill River (e.g., sheens, floating product) due mainly to unknown sources. Additionally, several other spill reports were for discreet events or areas of the Site evaluated during the investigation of other AOCs. GEI reasoned that the evaluation of historic spills on-Site would be accomplished through sampling of groundwater monitoring wells across the Site and sediment samples collected from Site drainage structures. As such, no specific discussion was presented relative to an evaluation of AOC-4.

Total petroleum hydrocarbons (TPH) was detected in eleven of the soil samples collected near AOC-8, ranging in concentration from 30 parts per million (ppm) to 35,520 ppm. GEI attributed the TPH and polynuclear aromatic hydrocarbon (PAH) detections in this area to past oil releases or potentially contaminated fill.

The report indicates that GEI evaluated AOC-10 (Former Interior Chemical Storage Areas), located inside of English Station, using monitoring wells and soil borings at exterior locations around the building. Based on the results of their investigation, GEI concluded that the detection of contaminants in the exterior sample locations, particularly TB-108, were likely attributable to releases outside the building or the presence of fill.

GEI addressed AOCs 11 (On-Site Fill Material) and AOC-12 (Coal Storage) together in their Phase II/III report. GEI reported that analytical data for samples collected within the former coal storage area consistently contained contaminants including arsenic, PAHs, and TPH. The detected concentrations of one or more of these constituents often exceeded the applicable RSR criteria.

With respect to Site groundwater, GEI concluded that no VOCs or metals were detected above the applicable RSR groundwater criteria. GEI noted that one up-gradient deep well, MW-04D, contained low levels of solvent-related VOCs that were attributed to an unnamed, off-Site source. Several SVOCs, were detected in on-Site wells sampled during the Phase II/III. GEI attributed the occurrence of these constituents to the widespread fill across the area and not to any one AOC.

In addition to providing the results of their investigation, GEI's report summarizes options with respect to each of the evaluated AOCs. A notable, general conclusion made in the report is that non-aqueous phase liquids (NAPLs) were not observed or encountered at the Site during investigation activities. With respect to AOCs 3 and 4, GEI did not recommend any further work, as no impacts associated with the former septic systems (AOC-3) were identified and contamination attributable to past spills (AOC-4) was addressed by other AOCs.

2.2.3 1999 Preliminary Report #20210: Regarding Supplemental Environmental Investigation at the UI English Station, Enviroshield, Inc. (Enviroshield, 1999)

The Enviroshield 1999 Preliminary Report documented that a continuous oil film and strong petroleum odor was observed on the water table at GP-20A. Small globules of oil and a light petroleum odor were also noted in wells GP-30 through GP-32, GP-38 and GP-39. This area was subsequently remediated following a failure of the bulkhead surrounding Ball Island.

2.2.4 2000 Supplemental Field Investigation, GEI Consultants, Inc. (GEI, 2000b)

In May 2000, GEI completed a supplemental field investigation to further define previously identified areas of contamination on the Site for use in preparation of a Remedial Action Plan (RAP). The supplemental field investigation was based on the results of GEI's earlier Phase II/III investigation of the Site completed in 1998. The supplemental investigation was performed based on the premise that a Site-wide environmental land use restriction (ELUR) would be implemented, restricting land use to non-residential and restricting the disturbance of soil greater than 4 feet below existing grade.

At AOC-8, shallow soil TPH impacts were found adjacent to the east of the former No. 6 fuel oil AST and containment dike during the Phase II/III.

Arsenic concentrations above the applicable RSR criteria were identified in soils throughout AOC-12, the former coal storage and handling area, at depths ranging from 0 - 13 feet below ground surface (ft bgs). According to the report, the source of the contamination is attributed to the former storage/use of coal. Initially during the Supplemental Field Investigation, thirteen soil borings were completed within the former coal storage and handling area specifically to evaluate arsenic concentrations. However, additional arsenic analyses were run on soil samples collected from other nearby areas of the Site to provide a better definition of the extent of arsenic in soils.

Arsenic concentrations more than applicable RSR criteria were detected in soil samples collected from TB-231 through TB-235 and HA-3. Soil samples collected from other adjacent AOCs identified significant arsenic exceedances adjacent to Capacitor Bank 1 and the Southwestern Transformer Area. GEI concluded that the occurrence of arsenic in association with the former coal storage and handling area was "fairly well delineated". GEI did not render an opinion on the other areas of the Site where high concentrations of arsenic were detected in soils, such as Capacitor Bank 1 or the Southwestern Transformer Area.

To further evaluate the former wastewater treatment system (AOC-13) where lead, SVOCs and TPH were previously detected in soils, GEI collected soil samples from five additional soil borings (TB-202 through TB-206) in the area. According to GEI, the concentrations of SVOCs in the soil samples collected from these borings were high enough to indicate the potential presence of NAPL when the calculation presented in Section 22a-133k-2(c)(3) is applied. GEI subsequently concluded that delineation of the SVOC-impacted soil near the former wastewater treatment plant was adequate and noted that remediation of these soils would be required.

2.2.5 2000 Draft Remedial Action Plan, GEI Consultants, Inc. (GEI, 2000a)

The 2000 GEI Draft RAP summarizes environmental investigative work completed up to that point, provides an evaluation of RSR compliance, and presents remedial actions and objectives for several areas of the Site. The RAP presents actions GEI determined were required to bring the Site into compliance with the industrial standards of the RSRs. Remedial actions proposed by GEI in their Draft RAP were based primarily on their earlier Phase I ESA (1998), Phase II/III (1998), and Supplemental Environmental Investigation (2000), summarized previously.

To address contaminants in soil at concentrations above the Residential (RES) Direct Exposure Criteria (DEC), GEI indicated that a Site-wide ELUR would be recorded, allowing compliance with the Industrial/Commercial (I/C) DEC and the groundwater Class GB Pollutant Mobility Criteria (PMC). At those AOCs where contaminants in soil exceeded the GB PMC, excavation to the seasonal high-water table and off-Site disposal was the remedial method specified. Contaminants detected in soil at concentrations above the I/C DEC only would be rendered inaccessible through the placement of 2 feet of clean fill and finishing with three inches of asphalt.

Though SVOCs in soil at the former Station B USTs (AOC-2) and the former wastewater treatment system (AOC-13) were detected at concentrations indicative of potential NAPL, GEI reasoned that recoverable NAPL that requires remediation under Section 22a-133K-2(g) was not believed to be present at the Site for the following reasons:

- A review of the Site history did not indicate the release of any significant quantities of NAPL;
- Free phase NAPL layers had not been detected in any of the monitoring wells at the Site;
- Elevated SVOCs were present in part due to coal ash, not due to the release of liquids containing SVOCs;
- Concentrations of SVOCs in groundwater did not indicate that the presence of NAPL is likely; and

- The equation to predict the presence of calculated NAPL includes a factor of safety and is only one of several general indications that are used to suggest the possible presence of NAPL.

Additionally, GEI noted that no groundwater remediation was required, though continued groundwater monitoring would likely be required to demonstrate compliance with the RSRs, specifically the Surface Water Protection Criteria (SWPC).

2.2.6 2001 Remedial Action Plan for Former Coal Yard Area, Advanced Environmental Interface, Inc. (AEI, 2001)

Shortly after the Site was sold to Quinnipiac Energy (QE), AEI was retained to prepare and implement a RAP for the former coal yard (AOC-12). According to the plan, the former coal yard was being considered for remediation ahead of planned construction activities associated with the potential re-powering of the Site.

AEI's RAP was based solely on previous Site investigations and relied heavily on the early work completed by GEI and Enviroshield. Based on AEI's review of the existing data for the former coal yard, they determined that soil within the former coal yard generally contained concentrations of arsenic above the I/C DEC. Groundwater that contained lead and PAHs above the SWPC was also identified in monitoring wells along the eastern property boundary.

According to AEI's analysis, there was no apparent pattern to arsenic distribution, except that most of the detected arsenic concentrations were in the shallow soils in and around the former coal storage/handling area. AEI acknowledged a "hot spot" in the south portion of the former coal yard, north of the Plant, that had high levels of arsenic. Based on the figures included in the plan, this area appears to correspond with former Capacitor Bank 1.

To achieve compliance with the RSRs, AEI proposed to use planned construction activities to render soils inaccessible (e.g., covered with 2 feet of fill with asphalt barrier or four feet of fill with no barrier) and environmentally isolated (e.g., concrete building floors and pads), record an ELUR to prevent future disturbance of soil, and where necessary, excavate and dispose of contaminated soil. AEI also planned additional sampling across the former coal yard and surrounding area (23 soil borings) and the area around former Capacitor Bank 1 (8 shallow soil samples with hand tools).

2.2.7 2015 Draft Section 4 Subsurface Investigation for the Former English Station, HRP (HRP, 2015)

In 2015, HRP completed a subsurface investigation on behalf of UI to characterize the distribution of soil and groundwater contamination near select AOCs identified for the Site. The subsurface investigation was completed in accordance with a Generalized Scope of Work Plan submitted to the CT DEEP in February 2014. The investigation activities were completed to provide a preliminary evaluation of the distribution of contamination in select AOCs and were not meant to fully characterize the Site. Areas of the Site investigated at this time included the following:

- AOC-1: Station B Building;
- AOC-7: Above Ground Waste Oil Storage Tank and Oil Pump;
- AOC-8: Above Ground Fuel Oil Storage Tanks;
- AOC-12: Cooling Water Discharge Tunnel;

- AOC-13: Former Wastewater Treatment Facility;
- Various exterior areas of Parcel B; and
- Groundwater monitoring wells (sampling of existing wells) at various locations across the Site.

HRP's evaluation of AOCs 7, 8, and 13, all located in the southwest portion of the Site, involved the drilling of twenty soil borings and the collection and laboratory analysis of 40 soil samples. Photoionization detector (PID) readings were detected in several soil samples ranging to 108.3 milligrams per kilogram (mg/kg), with the maximum reading detected at a depth of 13-15 ft bgs in soil boring SB-092914-109. Additionally, a sheen was observed at 8.5 to 10 ft bgs and 14 to 15 ft bgs in soil borings SB-093014-112 and -113, respectively. None of these soil samples exceeded ten times (10x) the groundwater protection criteria (GWPC) when analyzed using SPLP methodology.

2.3 Nature and Extent of Contamination

Weston & Sampson performed Site investigation between July and September 2017. The investigation included the collection of soil and sediment samples for laboratory analysis. The investigation was performed in accordance with TRC's Scope of Study (SOS), English Station, revised July 2017, which was reviewed by the CT DEEP. Please refer to **Figures 2 and 3** for the locations of the AOCs described below and **Tables 1 through 14** for a summary of soil analytical data.

2.3.1 Widespread Polluted Fill

On March 27, 2003, the CT DEEP issued "Approval of Widespread Polluted Fill Variance" for the Site based on an application prepared by AEI on behalf of QE. The application noted that the Site subsurface includes widespread polluted fill from historic dredging operations and that:

- Sediments impacted by historical industrial use along the Mill River had been used to construct Ball Island. Prior to 1886, there were sand bars present in the current location of Ball Island. The grades of these sand bars were raised enough to allow for commercial development of Ball Island after 1886. Grades were subsequently further raised to allow for construction of Station B on the northern portion of the Site in 1901 and subsequently, fill was placed on the southern portion of the Site to allow for construction of the English Station Power Generation Facility by 1935. Construction of final grades at the Site using sediments appears to have been completed by 1953.
- Sediments in the Mill River had been impacted by historical industrial operations which included coal gasification, storage and burning of coal in electrical generating facilities, metal processing, and lumber storage. These activities had impacted sediment within the Mill River with petroleum hydrocarbons and associated semivolatile organic chemicals, polynuclear aromatic hydrocarbons, and metals.
- These impacted sediments were used to construct Ball Island above the mean low water level in the Mill River.

Thus, soil impacted with metals, polynuclear aromatic hydrocarbons, and petroleum hydrocarbons that are believed to be present in the fill materials and not because of releases at the Site after the fill was placed are subject to the approved variance request. As such, the pollutant mobility criteria (PMC) are

not applicable to these chemicals. However, remediation to address direct exposure criteria (DEC) is still required.

Results of the Weston & Sampson Site Investigation and other historical investigations identified petroleum hydrocarbons, polynuclear aromatic hydrocarbons, and metals in soil Site-wide and that some of these analytical results exceeded remedial criteria (i.e., PMC and DEC). As polynuclear aromatic hydrocarbons and metals are ubiquitous in fill material at the Site, delineation of exceedances is not considered feasible. However, these impacts are more consistent and widespread on the north side of the site. On the south side, areas that were filled last, these impacts are not as widespread.

2.3.2 Parcel A and North Side of Parcel B Areas of Concern

The northern side of the Site contains AOC-1, AOC-2, AOC-5, AOC-6, AOC-12 (split into AOC-12E, 12W, and 12N), AOC-14 and AOC-15. Each AOC was previously investigated for soil, sediment, and porous media. Findings of the investigation for the above AOCs are provided below:

AOC-1 Station B

- Station B will be abated of hazardous building materials and then demolished during the performance of remedial activities at the Site.
- Analysis of soil samples beneath the structure identified arsenic at concentrations that exceed the I/C DEC and these impacts will be rendered inaccessible.

AOC-2 Station B Former UST Area

- Four petroleum USTs were previously removed from this area in 2002 and a remedial excavation was performed to remove impacted soil. Post excavation soil sampling identified petroleum impacts.
- Analysis of soil samples did not identify concentrations of petroleum hydrocarbons or VOCs above remedial criteria. PAHs were identified at concentrations above remedial criteria but are associated with Site-wide fill material.

AOC-5 Bulkhead PCB Remediation Area

- In 1998, oil-impacted soil was identified within this area after a section of the bulkhead constructed around the Site gave way. The bulkhead was repaired, and soil was excavated and removed.
- Weston & Sampson collected surficial soil samples to assess potential impacts from tracking. Deeper soil samples were collected from select boring locations to confirm the previous excavation was successful in removing impacted soil. Analysis of soil samples did not identify concentrations of petroleum hydrocarbons or PAHs above remedial criteria.

AOC-6 Capacitor Release/Outdoor Capacitor Banks 1-3

- Non-PCB impacts were not present in AOC-6.

AOC-12E

- AOC-12E (PCB Area 6.2) is located within the northeastern portion of the Site in an area

historically used for coal storage. Weston & Sampson performed investigation in an area where petroleum-impacted soil was previously identified and delineated these impacts.

AOC-12N Former Coal Storage

- AOC-12N is located south of Station B. Petroleum-impacted soil was identified in a historical soil boring within this area.
- Analysis of soil samples did not identify petroleum impacts above remedial criteria.
- PAHs and arsenic were detected above remedial criteria in two soil samples collected at depth and are associated with Site-wide fill.

AOC-12W

- ETPH concentrations that exceed applicable remedial criteria may be rendered inaccessible and no additional sampling or remediation will be required.
- PAHs and arsenic were detected above remedial criteria in multiple soil samples. The detected concentrations appear to be associated with Site-wide fill or former coal storage.

AOC-14 Cooling Water Tunnel

- AOC-14 consists of a former Cooling Water Discharge Tunnel that is located within the North Side of the Site. Weston & Samson performed sediment and porous media sampling in the tunnel every 10 feet, where accessible, to characterize potential impacts.
- Sediments were found to be impacted with petroleum hydrocarbons, PAHs and remediation is anticipated to mitigate these materials. Impacts to concrete were less than applicable remedial criteria and concrete can be left in place and rendered inaccessible.

AOC-15 Oil Stained Area North of English Station / Release to Catch Basin 4

- AOC-15 is located adjacent to and north of the English Station building. During demolition and asbestos abatement of the building in 2011 and 2012, spillage and subsequent tracking resulted in a large oil stain on pavement adjacent to the north side of the building. Catch Basin 4 is located within the oil stained area.
- Elevated concentrations of petroleum hydrocarbons were identified in two soil samples above remedial criteria, but these impacts are sufficiently delineated to plan remediation. PAHs were also detected above remedial criteria at one of these locations, but the PAHs are part of the impacted Site-wide fill.
- Analysis of a sediment sample collected from catch basin CB-4 identified arsenic and lead at concentrations above remedial criteria.

2.3.3 South Side Parcel B Remediation Areas

The southern side of the Site consists of AOC-3, AOC-7 through AOC-11 and AOC-13. Major findings of the investigation for the above AOCs are provided below:

AOC-3 Former Septic Systems

- AOC-3 includes two former septic system locations within the south side of the Site. Historic

maps depict the locations of the historic septic structures; one located on the western side of the Site (Septic West) and one along the eastern side of the Site (Septic East).

- Weston & Sampson advanced soil borings and collected porous media (concrete and asphalt) samples within the area of Septic West and East. Sediment samples were also collected within each structure. PAH and metal impacts to soil and sediments exceeding applicable remedial criteria were identified.

AOC-7 Former Waste Oil Aboveground Storage Tank (AST) / Oil Pump Room Area

- AOC-7 is located within the southeastern corner of the Site. A former waste oil AST was located adjacent to the southeastern corner of the English Station building. An oil pump house that serviced the building boiler system was also located in this area. Numerous soil borings were advanced throughout AOC-7. Porous media (concrete and asphalt) samples were also collected at boring locations and from concrete pads and pipe trenches. Sediment samples were also collected from manhole structures and pipe trenches.
- Historical and recent data have found evidence of ETPH releases to this area of the Site.

AOC-8 Former Fuel Oil ASTs

- AOC-8 is located within the southern portion of the Site. One 50,000-gallon No. 6 fuel oil AST was previously located within a concrete containment berm located in the far southern end of the Site. To the west of the former No. 6 fuel oil tank, there were two 5,000-gallon No. 2 fuel oil ASTs that were formerly located in concrete cradles.
- Weston & Sampson advanced soil borings, collected surficial soil samples, and porous media samples (concrete and asphalt) throughout AOC-8. Sediment samples were also collected from pipe trench and sump structures within the AOC. Petroleum hydrocarbon impacts were not identified in soil but identified in sediment.

AOC-9: Transformer Areas

- AOC-9 is located within the southwestern portion of the Site, to the west of the English Station building. Multiple historic transformers and capacitors were in this area. Numerous soil borings were advanced throughout AOC-9 and porous media (concrete and asphalt) samples were also collected at boring locations and from concrete pads and pipe trenches. Sediment samples were also collected from manhole structures and pipe trenches throughout the AOC.
- Historical and current data have identified releases of petroleum hydrocarbons from historical Site operations.

AOC -10 Former Interior Chemical Storage Areas

- AOC-10 is comprised of outbuildings located within the southwestern and southern portions of the Site associated with former interior chemical storage. Weston & Sampson advanced soil borings, collected numerous porous media (concrete) samples, and one sediment sample within AOC-10.
- Limited impacts to shallow soil beneath the buildings were identified.

AOC -11 On-Site Fill Material: Evaluation of Tracking

- AOC-11 is fill material located throughout the Site. The fill material has been adequately

characterized by others during previous investigatory efforts. This investigation included evaluation of tracking across pads/structures not captured by other AOCs. Weston & Sampson collected three porous media (concrete) samples from concrete pad structure P12 located in the southwestern portion of the Site. There was no sediment observed within the manholes of this structure and therefore, samples were not collected.

- Results of the investigation indicate surface concrete at structure P12 is not impacted. The data obtained from across the Site do not indicate that tracking of the COCs that are the focus of this RAP is an issue that needs to be addressed as part of the remedial actions.

AOC -13 Former Wastewater Treatment System

- AOC-13 is located within the southeastern portion of the Site, east of the English Station building and includes remnants of a former wastewater treatment system (primarily concrete pads). The operational history of this former treatment system is not well documented in historic reports. Weston & Sampson advanced soil borings and collected porous media samples (asphalt and concrete) throughout AOC-13. Sediment samples were also collected from pipe trenches in this area.
- Field screening of soil samples and results from the laboratory analysis of the soil samples indicate that releases of petroleum hydrocarbons have occurred during historical Site operations and these impacts will require remediation. Analysis of sediment samples identified ETPH in sediments collected from trenches likely from releases during historical Site operations.

2.4 Conceptual Site Model

Based on the review of Site history and investigations, Weston & Sampson has developed a Conceptual Site Model (CSM) for non-PCB Site impacts. The primary source for non-PCB impacts is the use of dredged sediments to construct Ball Island. To a more limited extent, releases from operations at the power plants (i.e., Station B and English Station) have also led to impacts at the Site. The nature and extent of these operations-related releases are summarized in the Weston & Sampson North Side Investigation Summary Report and the South Side Investigation Summary Report (Weston & Sampson, January 2018 and March 2018, respectively). The North Side Investigation Summary Report is attached electronically in Appendix A and the South Side Investigation Summary Report is attached electronically in Appendix B.

Soil sampling data was used to determine if a release to the environment occurred at the Site. As noted in Section 2.3, tracking of COCs was identified as a potential release mechanism at this Site, however, the results of sampling did not confirm this as an actual release mechanism. Non-PCB COCs were identified within specific areas of concern and are associated with specific releases or historical practices. Stormwater, cooling water and wastewater transported impacted soil/sediment within associated water conveyance structures (e.g., tunnels, trenches) was also determined to not be a current significant release mechanism because these water tunnels and trenches no longer discharge to the environment. Additional transport mechanisms, such as erosion from wind and precipitation were not found to be significant at the Site.

3.0 REMEDIAL ACTION PLAN

This section outlines the plans and procedures to be implemented for the remediation of COCs other than PCBs in soils at the Site. Planned non-PCB impacted soil remediation activities will be completed in accordance with the requirements of Connecticut's RSRs. Details regarding the remedial objectives, scope, and sequence of remediation are provided below.

3.1 Remedial Objectives and Approach

Remediation of PCB impacts will be completed and confirmed through the collection of confirmation samples in all areas to be remediated for other COCs at the site. Following the remediation of PCBs, the approach of the proposed remedial action for other COCs is:

- In areas where grades are to be maintained at current elevations, soil will be excavated to depths such that the impacted soil beneath will be rendered inaccessible following site restoration.
    - Excavated soil from excavations performed to address other COCs will be transported offsite for appropriate disposal.
- To maintain the asphalt paving and soil barriers in perpetuity, an environmental land use restriction (ELUR) will be applied to the barrier areas. The ELUR will also restrict future site use to industrial/commercial use.
- Barrier placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement will render soil exceeding the I/C DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32)(A) and (B). These barriers will be constructed over nearly all of Parcel A and the northern portion of Parcel B. Barriers will also be constructed over large portions of Parcel B.
- Petroleum impacts to soil that are likely from releases due to site operations will also be rendered inaccessible. When the petroleum impacts are found above the seasonal high water, which is approximately three feet below the ground surface over much of the site, and analytical results indicate that the GB PMC is also exceeded, additional excavation will be performed.

These remedial objectives will be achieved by the following approach detailed further in this report. The elements of the overall approach to remediation of soils at the Site include:

- Preparation of remedial plans and permits;
- Site preparation and establishment of temporary facilities, including Site security, signage and erosion and sedimentation controls;
- Excavation and off-Site disposal of non-PCB-impacted soil;
- Collection of verification soil samples for non-PCB-impacted soil, analysis to confirm the limits of soil remediation;
- Preparation of sub-grade by shaping the Site soils to provide a 2% grade for surface drainage;
- Construction of soil and soil/asphalt barriers to render soils inaccessible;
- Final restoration of soil excavation areas; and
- Recording ELURs on the land records.

This remedial plan focuses on the remediation of non-PCB-impacted areas only. PCB remedial actions to be performed at the Site are described in a separate plans to be executed prior to the implementation of non-PCB remedial actions.

3.2 Remedial Planning

The following sections summarize anticipated planning tasks to be performed prior to implementation of the remedial action.

3.2.1 Permits

The following permits and approvals from federal, state and local government agencies may be required for Site remediation and obtained by the remedial contractor:

- Connecticut Department of Energy & Environmental Protection (CTDEEP) General Permit for Discharge of Groundwater Remediation Wastewater Directly to Surface Water.
- CT DEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.
- Stormwater Pollution Control Plan
- City of New Haven Coastal Site Plan Review
- City of New Haven Building Permits.
- City of New Haven Demolition Permits.

Permit application signature pages for permit applications already submitted are included in Appendix C.

3.3 Public Notification

In accordance with the PCO and the RSRs, public notice for these activities is required. In accordance with CGS Section 22a-134a(i), TRC, on the behalf of UI, will provide public notice of the intent to remediate. The methods of public notice will include the following:

- Public notice will be published in a local newspaper having substantial circulation in the area affected by the Site.
- Notification will be issued to the director of the City of New Haven Health Department.

A sign will be erected on the Site (at least 30 days prior to the start of remediation activities) and contain the text prescribed in CGS Section 22a-133x. Proof of the published public notice and a picture of the sign posted is provided in Appendix D.

3.4 Site Preparation and Temporary Construction Controls

3.4.1 Site Security

Existing Site fencing will be maintained and access from Grand Avenue restricted to authorized personnel via gates. The existing fencing and island location of the Site will restrict access to the Site and limit trespassing. In areas where the steel bulkhead provides a shore barrier, no additional barriers are required. Repairs to the existing fencing and gates will be made before and during the construction

project, as needed.

3.4.2 Erosion and Sedimentation Controls

Erosion and sedimentation control measures will be implemented prior to any on-Site earthwork to prevent the migration of soils from the Site. The primary source of potential soil will be the stockpile(s) of impacted soil that will temporarily exist on-Site prior to on-Site relocation or off-Site shipment for disposal.

Stockpiles will be constructed in a manner to contain and secure the material and prevent contact of the stockpiled material with the ground beneath it or release of any stockpiled material to the surrounding area. Soils will be stockpiled on and covered by plastic sheeting, which will be anchored with sandbags or other materials to contain the soils and minimize potential exposure. Hay bales may be placed around areas used for stockpiling to prevent the migration of contaminated soil from the stockpile. The remedial contractor will also install and maintain catch basin protection to prevent sediment migration.

3.4.3 Dust Monitoring

Dust monitoring for total particulate emissions and fugitive dust within work areas and at the Site perimeter will be implemented during soil excavation and soil handling activities to reduce potential exposures to on- and off-Site receptors during remediation. Monitoring will be conducted continuously using real-time measurement equipment, and the results will be reviewed by the oversight engineer and remedial contractor to determine the extent of dust controls required. At a minimum, dust controls will include the use of windscreens on temporary fencing and use of polyethylene sheeting over temporary stockpiles. If necessary, active dust controls, such as wet spraying will also be deployed to reduce fugitive dust emissions and meet applicable National Ambient Air Quality Standards for particulate matter (PM).

3.4.4 Debris Removal

Areas of the Site requiring debris removal include areas of metal debris, wood debris, and a trailer. These materials will be relocated on-Site by the remediation contractor or appropriately disposed of/recycled. As appropriate, dust controls will be implemented during the movement of debris.

3.4.5 Clearing and Grubbing

Vegetation in remedial areas requiring removal will be cleared and grubbed by the remedial contractor. These areas are located along the East Branch Mill River and West Branch Mill River. The remedial contractor will remove of stumps and roots and properly dispose of these materials. The clearing and grubbing of PCB-impacted areas will be performed under separate RAPs and will be completed prior to the implementation of non-PCB remedial actions.

3.4.6 Remediation Sequencing

Non-PCB remediation work will proceed after the completion of remedial activities described in the PCB RAPs are completed. The non-PCB remediation work will be sequenced as follows:

a) Permitting and submittals;

b) Installation/repair of construction fencing, wind screens, signage, and erosion controls;
c) Temporary water, and if needed electric, utility service;
d) Dust controls and monitoring;
e) Debris removal and clearing and grubbing;
f) Excavation of non-PCB impacted soil with proper off-Site transport and disposal;
g) Subgrade shaping of polluted soils being rendered as "Inaccessible Soil";
h) Render polluted soil exceeding the I/C DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32)(A) and (B) by placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement;
i) Site restoration and demobilization; and
j) Implementation of deed restriction (ELUR).

3.5 Soil Excavation

The remedial approach includes construction of soil and soil/asphalt barriers as described in Section 3.9. To achieve the proposed final elevations, shaping of the surface of polluted soil to remain will be performed to promote drainage. Excess soils will be generated that will be impacted with non-PCB COCs. All excess soil will be removed and disposed off-site.

The remedial contractor will characterize, transport and dispose of surplus soils at a permitted disposal receiving facility. Site soils requiring disposal will be accompanied with proper disposal documentation. Based on the excavation limits identified, remediation will require the removal of 23,500 cubic yards of non-PCB impacted soil to meet the elevations for barrier construction.

The soil and soil/asphalt barriers will include excavation and surface shaping to achieve sub-grade conditions above which the demarcation layer and soil and soil/asphalt barriers will be constructed. In the soil/asphalt barrier areas, the surface asphalt layer will be milled and disposed of/recycled off-Site and no asphalt/bituminous paving fragments will be allowed to be used or incorporated into fill on the Site. The subgrade of the soil/asphalt barrier will be 27 inches below final grades. To achieve this cut, excavation will be performed of on-Site soils. Please refer to Section 3.9.3 and Section 3.9.5 for details of the construction of the soil barrier and soil/asphalt barrier, respectively.

3.6 Post-Excavation Verification Sampling

Discrete soil samples will be collected from the excavations to evaluate whether the remaining soil complies with the remediation objectives. The soil samples will be collected from the excavation sidewalls at an approximate frequency of one sample per 20 linear feet of sidewall and every two feet of depth, with a minimum of one sample collected per sidewall. Soil samples will be submitted for arsenic, PAHs, and ETPH.

The engineer overseeing the remediation will field screen the soils for VOCs using a photoionization detector (PID) and inspect the soil for evidence of contamination. The soil samples will be collected into pre-preserved sample containers provided by the laboratory, stored in iced coolers, and transported via courier to the laboratory for analysis. The analytical laboratory selected for this project will be a State of Connecticut-certified public health laboratory. For quality assurance/quality control (QA/QC) purposes,

one trip blank per cooler and one duplicate soil sample per 20 samples will also be collected for laboratory analysis. To minimize risks associated with personnel entering open excavations, the soil samples will be collected using the bucket of the excavator or backhoe, as necessary.

3.7 Waste Management

Wastes generated during the implementation of this Partial RAP will be properly disposed of in accordance with applicable federal, state and local regulations. This section describes the anticipated non-PCB wastes.

3.7.1 Soil

Non-PCB-impacted soils will be excavated and those soils that cannot be relocated on-Site will be properly disposed of off-Site. These surplus soils will be characterized for the analytical parameters and at a sampling frequency required by permitted receiving facilities. The results of the waste characterization will be used to determine the proper receiving facility and disposal method. Disposal documentation (i.e., waste manifests) will accompany each truckload of surplus soil. Receiving facilities will return weight slips and disposal documentation which will be included in future reports to the CT DEEP.

3.7.2 Dewatering Effluent from Excavations

Groundwater depths at the Site range from 3 to 5 feet below ground surface. Depth of excavation may intercept the groundwater table and require dewatering. To manage dewatering fluids, the remedial contractor will pump dewatering fluids to fractionation tank(s) for treatment. Treatment and discharge will be in accordance with effluent standards set by CT DEEP for discharge to a surface water body. The remedial contractor will obtain a general permit for the discharge of groundwater remediation wastewater to a surface water body from CT DEEP. Based on analytical data, treated dewatering fluids meeting discharge limits will be discharged to surface water. Treated dewatering fluid discharges will be performed per the requirements of the discharge permit obtained from CT DEEP.

3.8 On-Site Soil Handling

Relocation of non-PCB polluted soil will not be permitted. Shaping and grading of polluted soil being rendered as “Inaccessible Soil” will be performed to establish the subgrade elevations needed to place soil and soil/asphalt barriers to the grades shown on the drawings and promote surface drainage. Once compaction and sub-grade elevations have been achieved, the remedial contractor will begin Site restoration tasks detailed in the next section.

3.9 Site Restoration

This section describes the remedial contractor’s Site restoration activities. These activities include installation of barrier components, backfilling excavations, and final surface restoration activities detailed below.

3.9.1 Installation of Demarcation Barriers

An orange demarcation layer will be applied to the soil and asphalt barrier areas. Orange demarcation

layers serve as a visual warning to potential future contractors indicating impacted soils are present at depth. The demarcation layer will serve as a barrier and will be documented in the ELUR (deed restriction). The orange demarcation layer will be placed above relocated/"native soils" and serve at the sub-grade elevation of the two barrier types.

3.9.2 Backfilling Excavations

Suitable soil fill material is needed to render underlying polluted soil inaccessible with either 4-feet of suitable soil or 2-feet of suitable soil with 3-inches of bituminous concrete pavement. The following discussion provides a description of the soil materials that will be deemed acceptable and the methods that will be used to ensure quality control for these soil materials.

Excavated areas below the groundwater table will be backfilled with Non-Polluted Soil only as specified herein to the average groundwater table elevation (approximately elevation 4 ft bgs) or as required by the Engineer. Fill and backfill above the groundwater table will be with Non-Polluted Soil and Natural Soil. Other soil materials used in Site restoration (e.g., screened soil materials, topsoil, gravel, crushed stone) will meet the gradation requirements in the technical specifications and chemical concentrations specified for Non-Polluted Soil.

The remediation contractor will be required to sample imported soil materials (i.e., Non-Polluted Soil or Natural Soil) and other soil materials to be used as specified in the Contract Documents (e.g., screened soil materials, topsoil, gravel, crushed stone.) that are proposed for use at the Site for chemical testing at a frequency of 1 sample per 500 cubic yards. Contractor will submit samples to an approved, independent laboratory certified by the Connecticut Department of Public Health for analysis for the following chemical parameters:

a. Petroleum hydrocarbons by the CT DEEP Extractable Total Petroleum Hydrocarbons (ETPH) Method;
b. Volatile organic compounds (VOCs) by EPA Method 8261;
c. Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
d. RSR 15 metals by EPA Methods 6010 and 7471;
e. Pesticides by EPA Method 8081; and
f. PCBs by EPA Method 8082 with soil extraction by EPA Method 3540.

All analytical testing procedures will conform to Connecticut's Reasonable Confidence Protocols (RCPs) and the contractor's consultant will perform a Data Quality Assessment/Data Usability Evaluation as per CTDEEP requirements.

3.9.2.1 Non-Polluted Soil

Non-Polluted Soil shall be granular, well-graded friable soil; free of sediment, asphalt fragments, rubbish, debris, wood, glass, concrete, metal, bricks, ice, snow, tree stumps, roots, clay, organic matter and any non-soil deleterious material; with 25 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or three (3) inches, whichever is smaller. Soil material acceptable for use shall be classified as GM, GC, SM or SC according to the Unified Soil Classification System and shall have a plasticity index of less than 10.

Chemical properties for all soil materials must meet the following specifications for chemical concentrations to be classified as Non-Polluted Soil:

a. Soil defined as unconsolidated geologic material overlying bedrock, but not including sediment, and not affected by a release of a substance. A Release is defined as any discharge, spillage, uncontrolled loss, seepage, filtration, leakage, injection, escape, dumping, pumping, pouring, emitting, emptying, or disposal of a substance. A Substance is defined as an element, compound or material, which when added to air, water or soil or sediment may alter the physical, chemical, biological or characteristic of such air, water, soil or sediment. Sediment is defined as unconsolidated material occurring in a stream channel, estuarine waters, or marine waters. (Reference Connecticut Regulation of State Agencies 22a-133k-1(a) – Definitions)
b. No detectable concentrations of petroleum hydrocarbons as determined by CT DEEP ETPH Method with laboratory reporting limits less than the Analytical Detection Limit (ADL), Residential Direct Exposure Criteria (RDEC) and the GA PMC;
c. No detectable concentrations of VOCs by EPA Method 8260 with laboratory reporting limits less than the ADL, RDEC or the GA Pollutant Mobility Criteria (PMC) for each analyte;
d. No detectable concentrations of SVOCs by EPA Method 8270 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte;
e. Concentrations of RSR 15 metals by EPA Methods 6010 and 7471 less than the lower of the ADL, the High Range Background Concentration (see table below for metals concentrations) and the GA PMC by SPLP Method for each metal;
f. No detectable concentrations of pesticides by EPA Method 8081 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte; and
g. No detectable concentrations of PCBs by EPA Method 8082 with laboratory reporting limits less than the ADL, RDEC or the GA PMC by SPLP Method.
h. The RDEC is the Residential Criteria provided in Appendix A and the GA, GAA Mobility Criteria (GA PMC) provided in Appendix B of the Regulations of Connecticut State Agencies, Section 22a-133k-1 through -3, inclusive.
i. Soil will be analyzed for each analyte for which an RDEC and GA PMC is provided.

Background Metals Concentrations

Metal	High Range Background Concentration (mg/kg)
Antimony	ND
Arsenic	5.4
Barium	800
Beryllium	3.5
Cadmium	0.3
Chromium	8.5
Copper	93
Lead	32
Mercury	0.08
Nickel	40
Selenium	49
Silver	0.83
Thallium	1
Vanadium	157
Zinc	130

ND – Not detected above laboratory reporting limits.

Source: Background concentrations for Connecticut Mesozoic Basin soils from Brown and Thomas, "Major and Trace Element Geochemistry and Background Concentrations for Soils in Connecticut," Northeastern Geoscience, Volume 32, 2014.

3.9.2.2 Natural Soil

Suitable fill listed as Natural Soil shall conform to the definition of Natural Soil as defined by the CTDEEP Solid Waste Regulations Section 22a-209-1, "Natural Soil" means soil in which all substances naturally occurring therein are presented in concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable. For the purpose of this definition, substance shall have the same meaning as in section 22a-133k-l of the Regulations of Connecticut State Agencies. Soil materials that do not meet the specifications for chemical concentrations to be classified as Non-Polluted Soil may be used onsite as Natural Soil as long as all of the metals conform to the following table that specifies the lower of the site background metals concentration and the RDEC. Metals must also conform to the GA PMC by SPLP method. In addition, all of the other substances (non-natural) must comply with the requirements of Non-Polluted Soil.

Natural Soil Metals Concentrations

Metal	Concentration (mg/kg)
Antimony	4
Arsenic	10
Barium	320
Beryllium	2.0
Cadmium	5
Chromium	72
Copper	760
Lead	400
Mercury	4
Nickel	70
Selenium	15
Silver	1
Thallium	5
Vanadium	390
Zinc	1,000

ND – Not detected above laboratory reporting limits.

Only non-polluted soil will be used to backfill excavations below the groundwater surface which averages approximately four ft bgs. All backfill materials will be placed and compacted in one-foot lifts and compaction to 90% of the modified proctor density will be required.

3.9.3 Construction of Soil Barriers

The area of soil barriers is depicted on Figures 6 and 7. The soil barrier will include four feet (48 inches) of tested and approved suitable soil above the orange demarcation layer and the underlying shaped polluted soil being rendered as “Inaccessible Soil”. The top six inches of the soil barrier will be loam. This loam layer will be seeded, and grass will be used to establish a vegetated turf layer. This turf, once established, will limit erosion.

The surface grade of the soil barrier will be graded to maintain a minimum of 12 inches of exposed steel bulkhead at the edge of the island. In this way, the soil barrier will be fully contained within the steel bulkhead and not overtop the bulkhead. The four-foot thick soil barrier will render the covered underlying polluted soils ”"Inaccessible Soil”.

3.9.4 Establishing Turf

As noted above, the soil barriers will be finished with a surface application of six inches of loam and seed to establish turf. Hydro-seeding of a seed mix suitable for the Connecticut climate will be applied

to the surface loam layer of the soil barriers. The turf root system will limit erosion of the soil barriers. Please refer to Figures 6 and 7 for a graphical depiction of the soil barrier areas to be finished with turf.

3.9.5 Soil/Asphalt Barrier

The remedial contractor will construct a soil/asphalt barrier in areas shown on Figures 6 and 7. As noted in Section 3.5, existing paving will be milled, and this material transported off-Site for proper disposal/recycling. Existing polluted soils will then be excavated to 27 inches below final paved elevations. The soil/asphalt barrier will then consist of the orange demarcation layer overlain by 24 inches of compacted, tested, and approved suitable soil overlain with the 3 inches of pavement. The 24 inches of soil will include approximately 15 inches of compacted sub-base overlain with 9 inches of compacted base material. The surface will include 3 inches of bituminous pavement. The soil/asphalt barrier will render underlying polluted soils, "Inaccessible Soil".

3.10 Equipment Decontamination

All materials and equipment used in the excavation of PCB-impacted soil will be decontaminated using appropriate procedures prior to use in the remediation of non-PCB impacted soil. Heavy equipment involved with the handling of non-PCB-impacted soil will be decontaminated prior to being removed from the Site. Solid wastes derived from excavation or decontamination will be placed with contaminated soil or containerized for appropriate off-Site disposal. Wash water from the decontamination of equipment will be collected and pumped to an on-Site temporary storage tank. The accumulated wash water will be sampled for disposal characterization analysis and transported and disposed of off-Site based on the characterization data, or alternatively, the water will be pumped to and treated through a temporary on-Site treatment system and discharged under a temporary dewatering permit (see Section 3.7.2).

3.11 Inspection and Monitoring Procedures During Construction

The excavation contractor will be required to keep daily logs of Site activities including estimates of the amount of soil moved during the day, as well as the personnel and equipment on-Site. The excavation contractor will submit copies of logs to the engineer overseeing the work at the beginning of each week. The contractor will provide the waste disposal documentation to the oversight engineer upon receipt.

The oversight engineer will maintain daily logs and photographic documentation of the activities conducted. Daily logs will document personnel present on-Site, general Site conditions at the beginning and end of the Site work conducted that day, inspection of erosion and sediment control measure, number of trucks loaded for disposal, and samples collected and sent to the laboratory. All documentation will be included in the final Remedial Action Report (RAR).

3.12 Post-Remediation Reporting

The remediation oversight engineer will prepare reports to document the implementation of this Partial RAP. The RAR will include a summary of completed remedial actions including volume of excess non-PCB-impacted soils and disposal documentation. The oversight engineer will summarize the confirmatory sampling activities and results. If expanded soil excavation activities were performed based on confirmatory sampling results, those details will be summarized in the RAR. The soil and soil/asphalt

barrier construction will also be documented. The oversight engineer will also note, if present, significant deviations from the proposed final grades in the RAR report.

4.0 LIMITATIONS

This Remedial Action Plan was prepared for the use of UI, exclusively. The findings provided by Weston & Sampson in this report are based solely on the information reported in this document. Future investigations, and/or information that was not available to Weston & Sampson at the time of the investigation, may result in a modification of the findings stated in this report.

Should additional information become available concerning this Site or neighboring properties which could directly impact the Site in the future, that information should be made available to Weston & Sampson for review so that, if necessary, conclusions presented in this report may be modified.

The conclusions of this report are based on Site conditions observed by Weston & Sampson personnel at the time of the investigation, information provided by UI, and samples collected and analyzed on the date shown or stated in this report. This report has been prepared in accordance with generally accepted engineering and geological practices. No other warranty, express or implied, is made.

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FIGURES

TABLES

APPENDIX A

North Side Investigation Summary Report

APPENDIX B

South Side Investigation Summary Report

(Reports Provided on Disc

APPENDIX C

Permit Application Signature Pages

APPENDIX D

Public Notice Documentation

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

Weston & Sampson, on behalf of United Illuminating (UI), has prepared this Partial Remedial Action Plan (RAP) for the English Station property located at 510 and 510A Grand Avenue in New Haven, Connecticut (the Site). UI proposes to remediate soil at the Site as required under the Partial Consent Order (PCO - COWSPCB15-001) issued by the Connecticut Department of Energy and Environmental Protection (CT DEEP).

This Partial RAP presents the plans and procedures to be implemented for the remediation of soil containing Chemicals of Concern (COCs) other than polychlorinated biphenyls (PCBs) at the Site. However, the English Station Building and the large transformer at the northwest corner of the building are outside the limits of work for this partial RAP. The soil beneath the building and transformer will be remediated under a separate RAP. Thus, this remedial plan is partial in that it does not include the entire site. Remediation of PCBs in soil are being addressed under separate remedial plans (English Station Parcel A PCB Soil Remedial Action Plan and Parcel B PCB Soil Remedial Action Plan, Weston & Sampson, August 2019). PCB remedial actions will be completed within each remediation area prior to the implementation of this RAP.

The Site occupies approximately 9-acres of land located south of Grand Avenue in the City of New Haven. The Mill River borders the Site to the east, west, and south. UI operated electrical generating facilities on the property between 1929 and 1992. The Site location, surrounding area, and significant Site features are depicted on Figures 1 and 2.

Historically, the Site was constructed using dredged sediments as described in the "Request for Widespread Polluted Fill Variance," Advanced Environmental Interface, January 10, 2003. The variance was approved for the Site by the CT DEEP in a letter dated March 27, 2003.

Between July and September 2017, Weston & Sampson performed investigations to evaluate soil, groundwater, and porous media (concrete, wood, and asphalt) conditions. The analytical data generated during these Site investigations and other historical investigations has been used to develop the remedial actions described in this plan.

The COCs at the Site being addressed under this RAP include metals, primarily arsenic, extractable total petroleum hydrocarbons (ETPH), and the Semivolatile Organic Compounds (SVOCs) known as polyaromatic hydrocarbons (PAHs). Analytical testing was done at the Site for Volatile Organic Compounds (VOCs) and other SVOCs but remediation for these chemicals is not required based on the lack of evidence of releases to the subsurface as determined through the investigative process.

As noted above, the design for remediation of PCBs in soil is discussed in two separate RAPs. Remedial work at the Site will be phased such that PCBs remediations are completed prior to remediation of other COCs.

The remedial goals for the COCs at the Site as identified above that are germane to this RAP:

- Include rendering soil exceeding the Industrial/Commercial Direct Exposure Criteria (I/C DEC) inaccessible by constructing barriers consisting of an orange demarcation layer and either four

(4) feet of soil completed with grass or two (2) feet of backfill completed with three (3) inches of bituminous concrete;

- Assume that an Industrial/Commercial Environmental Land Use Restriction (ELUR) will be placed on the Site and that residential criteria will not be applicable; and
- Take into account that, for the Pollutant Mobility Criteria, the widespread polluted fill variance provides for compliance with these criteria unless the impacts are due to a release from Site operations after the fill was placed. No soils impacted by releases from site operations with COCs exceeding the GB PMC were identified.

This non-PCB RAP describes the measures to be implemented to achieve these remedial objectives.

This RAP includes the use of Environmental Land Use Restrictions (ELURs) to achieve remedial goals as well. The current and any future owners are obligated, in accordance with Consent Order COWSPCB 16-001, to comply with any and all ELURs recorded on the land records.

1.0 INTRODUCTION

Weston & Sampson, on behalf of United Illuminating (UI), has prepared this Partial Remedial Action Plan (RAP) for the English Station facility, a former electric power plant located at 510 and 510A Grand Avenue, New Haven, Connecticut (the Site). This RAP presents the plans and procedures to be implemented for the remediation of soil containing Chemicals of Concern (COCs) other than polychlorinated biphenyls (PCBs) at the Site. Remediation of PCBs are being addressed under separate remedial plans (Parcel A and Parcel B) that will be implemented prior to this non-PCB RAP. UI proposes to remediate the Site as required under the Partial Consent Order (PCO COWSPCB15-001) issued by the Connecticut Department of Energy and Environmental Protection (CT DEEP).

The English Station Building and the large transformer at the northwest corner of the building are outside the limits of work for this partial RAP. The soil beneath the building and transformer will be remediated under a separate RAP. Thus, this remedial plan is partial in that it does not include the entire site.

1.1 Site Location & Description

The Site consists of 9-acres of land located on a man-made island (Ball Island) situated within the Mill River which Flows north to south into the Long Island Sound. The Site has been split into two parcels (Parcel A and Parcel B), which are owned by two separate entities. The island is retained via steel bulkhead which surrounds the Site to the east, west, and south. The Site location is shown in Figure 1 – Locus Map. Geographic coordinates for the Site are:

Latitude/Longitude:	41° 18’ 23" North/72° 54’ 24" West
UTM Coordinates:	Zone 18 675,239.9 meters Northing 4,574,883.6 meters Easting

The north side of the Site as depicted on the figures, which includes Parcel A and the north side of Parcel B, consists of an area of approximately 3.6 acres. This portion of the Site is developed with a two-story former electrical generating plant, referred to as Station B. In addition to Station B, the north side of the Site also includes former locations of concern including the coal bin storage area, a storm water surge basin, cable houses, and a subsurface cooling water tunnel which formerly discharged water from Station B to the Mill River.

The south side of the Site as depicted on the figures, which includes the south side of Parcel B, consists of the remaining 5.3 acres of land located at the southern tip of Ball Island. Several structures currently stand within this portion of the Site, including the former English Station power generating plant. Of the 5.3 acres of land in the southern side of the Site, the former power plant foundation encompasses approximately 2.3 acres. Other buildings within this portion of the Site include a former assembly hall, storage building, and a foam house.

1.2 Site Background

The Site was first occupied by Enos S. Kimberly and Company in the late 1880s and was utilized as a coal and lumber facility. In 1890, New Haven Electric Company purchased the Site and began the

construction of Station B. As part of this construction, Ball Island's footprint was expanded via the filling of the portion of the Mill River south of the Site. Station B reportedly operated as a coal-fired power plant until 1903.

UI purchased the property in 1914 and began the construction of the English Station Power Plant in 1924. The initial construction consisted of coal-fired, low-pressure boiler and turbine areas, which were completed in 1929. Sometime between 1948 and 1952, two additional coal fired, high-pressure boilers and turbines were constructed at the southern end of English Station. At that time, Ball Island was further expanded to the South by the additional filling of the Mill River. The English Station Power plant operated as a coal-fired power plant until sometime in the mid-1950s when the plant was converted into an oil-fired plant. English Station then operated as an oil-fired plant until 1992 when it was placed on deactivated reserve status. In an attempt to preserve interior building conditions, several gas-fired boilers, temperature and humidity controls were installed.

In 2000, UI transferred the Site to Quinnipiac Energy, LLC (QE). At that time, an escrow of $1,900,000 was established by UI to support environmental investigation and cleanup of the Site. From 2000 through 2008, Advanced Environmental Interface, Inc. (AEI) performed environmental assessment activities on behalf of QE. Assessment activities were ceased in 2008, when the escrow funds were depleted. In 2006, prior to depleting the escrow funds, QE filed for bankruptcy and divided the property into two parcels (Parcel A and Parcel B). Subsequently, QE sold Parcel A to Evergreen Power, LLC (Evergreen) and Parcel B to ASNAT, LLC (ASNAT). Parcel A was recently sold to Haven River Properties and Parcel B was sold to Paramount View Millennium LLC.

In 2011, the Site owners at the time (ASNAT and Evergreen) contracted Grant Mackay Company (Grant Mackay) and Classic Environmental, Inc. (Classic Environmental) to demolish the existing on-Site structures with the intention of generating enough money through selling scrap-metal steel to fund the future environmental investigation and eventual cleanup of the Site. The initial focus of this project was at the main English Station power plant building. In 2012, CT DEEP conducted an on-Site inspection which concluded that there was potential for tracking and spreading PCB contamination from source areas to other uncontaminated areas of the Site. In February 2012, CT DEEP issued a Cease and Desist Order (CDOWSUST 12-001) which terminated all on-Site activities. The United States Coast Guard (USCG), issued an Administrative Order, 002-14, on September 19, 2012 to the new Site Owners and to UI as the former Site owner. Actions performed by the USCG included placing booms around the southern end of Ball Island and removal of liquid wastes and drummed materials from the Oil Room because of the potential to discharge to a nearby catch basin.

In July 2017, Weston & Sampson was granted Site access to observe current on-Site conditions. The Site is primarily improved with decaying impervious surfaces (asphalt and concrete), as evident by vegetation growth throughout the Site. Brushy vegetation had been allowed to grow in some areas of the Site and was removed from above the ground surface without disturbing underlying soils/roots to allow access to areas of the Site for the purposes of inspection and carrying out an environmental investigation exterior to the buildings.

1.3 Site Geology and Hydrogeology

1.3.1 Geology

According to the "Surficial Materials Map of the Connecticut," (Stone et al., 1992), the Site is located in an area underlain by fill. The 1998 Phase II/III report by GEI Consultants, Inc., indicates the fill material encountered during their investigation of the Site ranged in thickness from 9 to 16.5 feet and consisted of a variety of granular materials, including loose, poorly sorted sands and silt with fill materials including brick, ash, cinders, wood, glass metal, and plastic fragments.

Per GEI Consultants, Inc., a slightly plastic silt and fine sand layer was encountered beneath the fill layer and generally ranged in thickness from 5 to 11 feet. Numerous mollusk shells, fine roots, and other organic materials were observed in this layer. Occasional 1- to 3- inch thick layers of well-sorted and sub-rounded fine to medium sands were observed interbedded with the siltier portions of this strata. Interbedded fine to medium sand and slightly plastic silts were observed beneath the potential confining layer of slightly plastic silts.

According to the "Bedrock Geological Map of the Connecticut," (Rodgers, 1985), the bedrock beneath the Site consists of New Haven Arkose. This bedrock is described as consisting of reddish, poorly-sorted, coarse-grained, sandstone-like sedimentary rock.

1.3.2 Groundwater

Groundwater at the Site is classified as GB by the CT DEEP, indicating that it is not suitable for human consumption without treatment. Based on previous Site investigations, groundwater is generally observed in shallow overburden fill materials between approximately 3 and 5 feet below ground surface.

Water level measurements indicated that groundwater at the Site is tidally influenced with an approximately 0.5 to 1.0-foot fluctuation between high and low tidal cycles. Groundwater flows at low tide are typically towards the bulkhead. Groundwater flow at high tide depends upon the level of groundwater at the site which can be influenced by recent precipitation.

1.4 Applicable Regulations

Applicable Regulations for the Site remediation for COCs other than PCBs are the Connecticut Remediation Standard Regulation (RSRs) found in the Regulations of Connecticut State Agencies (RCSA), Section 22a-133k-1 through 3, inclusive. It is anticipated that an industrial/commercial (I/C) Environmental Land Use Restriction (ELUR) will be placed on the property in accordance to the requirements of 22a-133q-1 of the RCSA. As such, remediation will be performed to comply with the I/C Direct Exposure Criteria (DEC).

A Widespread Polluted Fill Variance was granted for the Site. Thus, remediation will not be performed to comply with the GB Pollutant Mobility Criteria (PMC) unless it is determined that the COCs present within an AOC are due to a release from Site operations and not from the historical placement of polluted fill.

1.5 ELUR Obligations

This RAP includes the use of Environmental Land Use Restrictions (ELURs) to achieve remedial goals as well. The current and any future owners are obligated, in accordance with Consent Order COWSPCB 16-001, to comply with any and all ELURs recorded on the land records.

2.0 SUMMARY OF SITE INVESTIGATIONS

Several Site investigations have been performed to evaluate the nature and extent of contamination at the Site. This section provides a summary of the investigation activities conducted to characterize the presence of non-PCB COCs. As noted in Section 1.2, soil containing extractable total petroleum hydrocarbons (ETPH), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), and metals has been identified at the Site. Details regarding Site investigation activities and the remedial strategy to address PCBs are provided in separate RAPs for Parcel A and Parcel B.

2.1 2017 Site Investigation

In 2017, Weston & Sampson performed an environmental site assessment as per the TRC Scope of Study dated July 2017. Samples were collected of soil, sediments, porous materials, and tested for PCBs, ETPH, SVOCs, VOCs, and metals. The data from this investigation for all analytical parameters except for PCBs are presented in Tables 1 through 14.

2.2 Historical Site Investigations

The following text is modified text from the TRC Scope of Study dated July 2017. This summary of environmental work was prepared by TRC and condensed by Weston & Sampson to reflect non-PCB historical assessments only relevant to this PARTIAL RAP.

2.2.1 1998 Phase I Environmental Site Assessment, GEI Consultants, Inc. (GEI, 1998a)

In 1998, GEI completed a Phase I Environmental Site Assessment (ESA) on the Site for UI. GEI noted that a 50,000-gallon vertical aboveground storage tank (AST), reportedly used for the storage of No. 6 fuel oil, was observed on the southern portion of the Site, to the south of English Station. In addition to the vertical AST, GEI noted two 5,000-gallon horizontal ASTs, reportedly used for the storage of No. 2 fuel oil, in the same area. All three tanks were located within brick and concrete containment dikes. GEI did not observe stains or leaking associated with the tanks during their Site reconnaissance.

GEI noted the following equipment during their inspection of the Site that may contain non-PCB oils:

- Southern Portion of Coal Handling Area: Three capacitor banks were observed in this area: two of the capacitor banks were reportedly located in a single enclosure at one location; a single capacitor bank was observed in another enclosure; and a third enclosure was observed to be empty. Tags reportedly indicated “No PCBs.”
- Bulkhead, Western, Southern and Eastern Sides: Three cathodic protection relays were observed by GEI along the western, southern and eastern sides of the bulkhead.

In addition to the equipment noted above, GEI observed two tank trucks in the central portion of the former coal handling area that UI personnel reportedly noted contained transformer fluid from the large “G” transformer located at the northwest corner of English Station.

GEI made the following conclusions and identified the following areas of concern at the completion of the Phase I ESA (GEI, 1998a):

- Four underground storage tanks (USTs) were formerly located in an area adjacent to the west side of Station B. According to information obtained from CT DEEP files, two older, 2,000-gallon gasoline USTs were installed at this location and removed in June 1991, when they were both replaced by 1,000-gallon USTs. A CT DEEP spill report noted that a nominal petroleum sheen was observed on the water table during the tank removal, although groundwater samples did not exhibit contamination. The 1,000-gallon USTs were reportedly removed in October 1996 and limited soil and groundwater sampling conducted at that time did not reveal the presence of contaminants.
- A 1967 CT DEEP inspection report (P-5) indicated that the Site was served by six separate septic tanks and associated leaching fields. The report notes that one of the septic systems was noted on a UI Site plan, to the north of the coal conveyor system. The locations of the other septic systems were not indicated by GEI in their report.
- Spill reports on file with CT DEEP identified nineteen separate spills in connection with the Site. Of these spills, roughly half were releases to the Mill River. Several others involved spills or releases of PCB-containing oils to soil or other areas on-Site, but generally did not identify specific locations.
- A waste oil AST was formerly located adjacent to the southeastern corner of English Station.
- One 50,000-gallon No. 6 fuel oil and two 5,000-gallon No. 2 fuel oil ASTs were noted on the southern portion of the Site, adjacent to English Station.
- Several station transformers, large circuit breakers, capacitor banks, and cathodic protection relays were observed across the Site.
- Three former chemical storage areas were identified within English Station, though their exact locations were not described by GEI.
- A former industrial wastewater treatment system was located southeast of English Station. At the time of the 1998 Phase I, the system was no longer present, although GEI noted remnants of the former wastewater treatment system (concrete pads, etc.) present adjacent to the north of the high-pressure boiler discharge point.
- GEI noted that based on their review of historic maps, aerial photographs and other documentation, much of the Site appears to be underlain primarily by fill material of an unknown quality and origin.
- Coal storage operations at the Site, south of Station B, were conducted over an extended period.
- The Site was identified as a Large Quantity Generator (LQG) of hazardous wastes. GEI noted that the Site may be considered an "Establishment" under the Connecticut Property Transfer Act. A 1992 CT DEEP Hazardous Waste Generation Report indicates 13,315 pounds and 966 gallons of hazardous waste were generated during deactivation of the Plant in 1991/1992.

2.2.2 1998 Phase II/III Field Investigation, GEI Consultants, Inc. (GEI, 1998b)

In July 1998, GEI returned to the Site to perform a Phase II and partial Phase III investigation. The purpose of the investigation was to assess soil and groundwater conditions in the AOCs identified in their earlier (May 1998) Phase I. GEI identified the following AOCs for the Site related to non-PCB impacts:

- AOC 2: Station B USTs. Four gasoline USTs were formerly located to along the west side of Station B. Two older 2,000-gallon gasoline USTs were removed from this area in 1991 and

replaced with two 1,000-gallon gasoline USTs. The 1,000-gallon gasoline USTs were removed in 1996. Only limited sampling was completed in this area.

- AOC 3: Former Septic Systems. CT DEEP documentation indicated as many as six septic systems were previously in use at the Site. Only one septic tank was identified by GEI during their review of plans for the Site.
- AOC 4: Past Spills. Several spill reports reviewed by GEI indicated sheens and releases to the Mill River occurred via the storm sewer system on-Site.
- AOC 7: Waste Oil AST/Oil Pump House. A former waste oil AST was identified by GEI as having been located next to the southeastern corner of English Station. An oil pump house that served high-pressure boiler units 13 and 14 was also located in this area.
- AOC 8: Fuel Oil ASTs. One 50,000-gallon No. 6 fuel oil AST and two 5,000-gallon No. 2 fuel oil ASTs were identified on the southern portion of the Site. All three tanks were located within secondary containment dikes; however, GEI noted surficial soil staining outside of the bermed area.
- AOC 10: Former Interior Chemical Storage Areas. Three former chemical storage areas were identified within the Plant building.
- AOC 11: On-Site Fill Material. Historic information reviewed by GEI indicated that much of the Site is underlain by fill material of an unknown origin and quality.
- AOC 12: Coal Storage. The central portion of the Site, south of Station B and north of English Station, housed coal storage and handling operations for an estimated 40-year duration.
- AOC 13: Former Wastewater Treatment Facility. According to GEI, a former wastewater treatment system was in the southeastern corner of the Site. Remnants of the treatment system, including concrete pads and a below grade pumping station, were observed by GEI during the Phase I.

With respect to the documentation of past spills on the Site, AOC-4, GEI noted that many of the spill reports were for evidence of discharges to the Mill River (e.g., sheens, floating product) due mainly to unknown sources. Additionally, several other spill reports were for discreet events or areas of the Site evaluated during the investigation of other AOCs. GEI reasoned that the evaluation of historic spills on-Site would be accomplished through sampling of groundwater monitoring wells across the Site and sediment samples collected from Site drainage structures. As such, no specific discussion was presented relative to an evaluation of AOC-4.

Total petroleum hydrocarbons (TPH) was detected in eleven of the soil samples collected near AOC-8, ranging in concentration from 30 parts per million (ppm) to 35,520 ppm. GEI attributed the TPH and polynuclear aromatic hydrocarbon (PAH) detections in this area to past oil releases or potentially contaminated fill.

The report indicates that GEI evaluated AOC-10 (Former Interior Chemical Storage Areas), located inside of English Station, using monitoring wells and soil borings at exterior locations around the building. Based on the results of their investigation, GEI concluded that the detection of contaminants in the exterior sample locations, particularly TB-108, were likely attributable to releases outside the building or the presence of fill.

GEI addressed AOCs 11 (On-Site Fill Material) and AOC-12 (Coal Storage) together in their Phase II/III report. GEI reported that analytical data for samples collected within the former coal storage area consistently contained contaminants including arsenic, PAHs, and TPH. The detected concentrations of one or more of these constituents often exceeded the applicable RSR criteria.

With respect to Site groundwater, GEI concluded that no VOCs or metals were detected above the applicable RSR groundwater criteria. GEI noted that one up-gradient deep well, MW-04D, contained low levels of solvent-related VOCs that were attributed to an unnamed, off-Site source. Several SVOCs, were detected in on-Site wells sampled during the Phase II/III. GEI attributed the occurrence of these constituents to the widespread fill across the area and not to any one AOC.

In addition to providing the results of their investigation, GEI's report summarizes options with respect to each of the evaluated AOCs. A notable, general conclusion made in the report is that non-aqueous phase liquids (NAPLs) were not observed or encountered at the Site during investigation activities. With respect to AOCs 3 and 4, GEI did not recommend any further work, as no impacts associated with the former septic systems (AOC-3) were identified and contamination attributable to past spills (AOC-4) was addressed by other AOCs.

2.2.3 1999 Preliminary Report #20210: Regarding Supplemental Environmental Investigation at the UI English Station, Enviroshield, Inc. (Enviroshield, 1999)

The Enviroshield 1999 Preliminary Report documented that a continuous oil film and strong petroleum odor was observed on the water table at GP-20A. Small globules of oil and a light petroleum odor were also noted in wells GP-30 through GP-32, GP-38 and GP-39. This area was subsequently remediated following a failure of the bulkhead surrounding Ball Island.

2.2.4 2000 Supplemental Field Investigation, GEI Consultants, Inc. (GEI, 2000b)

In May 2000, GEI completed a supplemental field investigation to further define previously identified areas of contamination on the Site for use in preparation of a Remedial Action Plan (RAP). The supplemental field investigation was based on the results of GEI's earlier Phase II/III investigation of the Site completed in 1998. The supplemental investigation was performed based on the premise that a Site-wide environmental land use restriction (ELUR) would be implemented, restricting land use to non-residential and restricting the disturbance of soil greater than 4 feet below existing grade.

At AOC-8, shallow soil TPH impacts were found adjacent to the east of the former No. 6 fuel oil AST and containment dike during the Phase II/III.

Arsenic concentrations above the applicable RSR criteria were identified in soils throughout AOC-12, the former coal storage and handling area, at depths ranging from 0 - 13 feet below ground surface (ft bgs). According to the report, the source of the contamination is attributed to the former storage/use of coal. Initially during the Supplemental Field Investigation, thirteen soil borings were completed within the former coal storage and handling area specifically to evaluate arsenic concentrations. However, additional arsenic analyses were run on soil samples collected from other nearby areas of the Site to provide a better definition of the extent of arsenic in soils.

Arsenic concentrations more than applicable RSR criteria were detected in soil samples collected from TB-231 through TB-235 and HA-3. Soil samples collected from other adjacent AOCs identified significant arsenic exceedances adjacent to Capacitor Bank 1 and the Southwestern Transformer Area. GEI concluded that the occurrence of arsenic in association with the former coal storage and handling area was "fairly well delineated". GEI did not render an opinion on the other areas of the Site where high concentrations of arsenic were detected in soils, such as Capacitor Bank 1 or the Southwestern Transformer Area.

To further evaluate the former wastewater treatment system (AOC-13) where lead, SVOCs and TPH were previously detected in soils, GEI collected soil samples from five additional soil borings (TB-202 through TB-206) in the area. According to GEI, the concentrations of SVOCs in the soil samples collected from these borings were high enough to indicate the potential presence of NAPL when the calculation presented in Section 22a-133k-2(c)(3) is applied. GEI subsequently concluded that delineation of the SVOC-impacted soil near the former wastewater treatment plant was adequate and noted that remediation of these soils would be required.

2.2.5 2000 Draft Remedial Action Plan, GEI Consultants, Inc. (GEI, 2000a)

The 2000 GEI Draft RAP summarizes environmental investigative work completed up to that point, provides an evaluation of RSR compliance, and presents remedial actions and objectives for several areas of the Site. The RAP presents actions GEI determined were required to bring the Site into compliance with the industrial standards of the RSRs. Remedial actions proposed by GEI in their Draft RAP were based primarily on their earlier Phase I ESA (1998), Phase II/III (1998), and Supplemental Environmental Investigation (2000), summarized previously.

To address contaminants in soil at concentrations above the Residential (RES) Direct Exposure Criteria (DEC), GEI indicated that a Site-wide ELUR would be recorded, allowing compliance with the Industrial/Commercial (I/C) DEC and the groundwater Class GB Pollutant Mobility Criteria (PMC). At those AOCs where contaminants in soil exceeded the GB PMC, excavation to the seasonal high-water table and off-Site disposal was the remedial method specified. Contaminants detected in soil at concentrations above the I/C DEC only would be rendered inaccessible through the placement of 2 feet of clean fill and finishing with three inches of asphalt.

Though SVOCs in soil at the former Station B USTs (AOC-2) and the former wastewater treatment system (AOC-13) were detected at concentrations indicative of potential NAPL, GEI reasoned that recoverable NAPL that requires remediation under Section 22a-133K-2(g) was not believed to be present at the Site for the following reasons:

- A review of the Site history did not indicate the release of any significant quantities of NAPL;
- Free phase NAPL layers had not been detected in any of the monitoring wells at the Site;
- Elevated SVOCs were present in part due to coal ash, not due to the release of liquids containing SVOCs;
- Concentrations of SVOCs in groundwater did not indicate that the presence of NAPL is likely; and

- The equation to predict the presence of calculated NAPL includes a factor of safety and is only one of several general indications that are used to suggest the possible presence of NAPL.

Additionally, GEI noted that no groundwater remediation was required, though continued groundwater monitoring would likely be required to demonstrate compliance with the RSRs, specifically the Surface Water Protection Criteria (SWPC).

2.2.6 2001 Remedial Action Plan for Former Coal Yard Area, Advanced Environmental Interface, Inc. (AEI, 2001)

Shortly after the Site was sold to Quinnipiac Energy (QE), AEI was retained to prepare and implement a RAP for the former coal yard (AOC-12). According to the plan, the former coal yard was being considered for remediation ahead of planned construction activities associated with the potential re-powering of the Site.

AEI's RAP was based solely on previous Site investigations and relied heavily on the early work completed by GEI and Enviroshield. Based on AEI's review of the existing data for the former coal yard, they determined that soil within the former coal yard generally contained concentrations of arsenic above the I/C DEC. Groundwater that contained lead and PAHs above the SWPC was also identified in monitoring wells along the eastern property boundary.

According to AEI's analysis, there was no apparent pattern to arsenic distribution, except that most of the detected arsenic concentrations were in the shallow soils in and around the former coal storage/handling area. AEI acknowledged a "hot spot" in the south portion of the former coal yard, north of the Plant, that had high levels of arsenic. Based on the figures included in the plan, this area appears to correspond with former Capacitor Bank 1.

To achieve compliance with the RSRs, AEI proposed to use planned construction activities to render soils inaccessible (e.g., covered with 2 feet of fill with asphalt barrier or four feet of fill with no barrier) and environmentally isolated (e.g., concrete building floors and pads), record an ELUR to prevent future disturbance of soil, and where necessary, excavate and dispose of contaminated soil. AEI also planned additional sampling across the former coal yard and surrounding area (23 soil borings) and the area around former Capacitor Bank 1 (8 shallow soil samples with hand tools).

2.2.7 2015 Draft Section 4 Subsurface Investigation for the Former English Station, HRP (HRP, 2015)

In 2015, HRP completed a subsurface investigation on behalf of UI to characterize the distribution of soil and groundwater contamination near select AOCs identified for the Site. The subsurface investigation was completed in accordance with a Generalized Scope of Work Plan submitted to the CT DEEP in February 2014. The investigation activities were completed to provide a preliminary evaluation of the distribution of contamination in select AOCs and were not meant to fully characterize the Site. Areas of the Site investigated at this time included the following:

- AOC-1: Station B Building;
- AOC-7: Above Ground Waste Oil Storage Tank and Oil Pump;
- AOC-8: Above Ground Fuel Oil Storage Tanks;
- AOC-12: Cooling Water Discharge Tunnel;

- AOC-13: Former Wastewater Treatment Facility;
- Various exterior areas of Parcel B; and
- Groundwater monitoring wells (sampling of existing wells) at various locations across the Site.

HRP's evaluation of AOCs 7, 8, and 13, all located in the southwest portion of the Site, involved the drilling of twenty soil borings and the collection and laboratory analysis of 40 soil samples. Photoionization detector (PID) readings were detected in several soil samples ranging to 108.3 milligrams per kilogram (mg/kg), with the maximum reading detected at a depth of 13-15 ft bgs in soil boring SB-092914-109. Additionally, a sheen was observed at 8.5 to 10 ft bgs and 14 to 15 ft bgs in soil borings SB-093014-112 and -113, respectively. None of these soil samples exceeded ten times (10x) the groundwater protection criteria (GWPC) when analyzed using SPLP methodology.

2.3 Nature and Extent of Contamination

Weston & Sampson performed Site investigation between July and September 2017. The investigation included the collection of soil and sediment samples for laboratory analysis. The investigation was performed in accordance with TRC's Scope of Study (SOS), English Station, revised July 2017, which was reviewed by the CT DEEP. Please refer to **Figures 2 and 3** for the locations of the AOCs described below and **Tables 1 through 14** for a summary of soil analytical data.

2.3.1 Widespread Polluted Fill

On March 27, 2003, the CT DEEP issued "Approval of Widespread Polluted Fill Variance" for the Site based on an application prepared by AEI on behalf of QE. The application noted that the Site subsurface includes widespread polluted fill from historic dredging operations and that:

- Sediments impacted by historical industrial use along the Mill River had been used to construct Ball Island. Prior to 1886, there were sand bars present in the current location of Ball Island. The grades of these sand bars were raised enough to allow for commercial development of Ball Island after 1886. Grades were subsequently further raised to allow for construction of Station B on the northern portion of the Site in 1901 and subsequently, fill was placed on the southern portion of the Site to allow for construction of the English Station Power Generation Facility by 1935. Construction of final grades at the Site using sediments appears to have been completed by 1953.
- Sediments in the Mill River had been impacted by historical industrial operations which included coal gasification, storage and burning of coal in electrical generating facilities, metal processing, and lumber storage. These activities had impacted sediment within the Mill River with petroleum hydrocarbons and associated semivolatile organic chemicals, polynuclear aromatic hydrocarbons, and metals.
- These impacted sediments were used to construct Ball Island above the mean low water level in the Mill River.

Thus, soil impacted with metals, polynuclear aromatic hydrocarbons, and petroleum hydrocarbons that are believed to be present in the fill materials and not because of releases at the Site after the fill was placed are subject to the approved variance request. As such, the pollutant mobility criteria (PMC) are

not applicable to these chemicals. However, remediation to address direct exposure criteria (DEC) is still required.

Results of the Weston & Sampson Site Investigation and other historical investigations identified petroleum hydrocarbons, polynuclear aromatic hydrocarbons, and metals in soil Site-wide and that some of these analytical results exceeded remedial criteria (i.e., PMC and DEC). As polynuclear aromatic hydrocarbons and metals are ubiquitous in fill material at the Site, delineation of exceedances is not considered feasible. However, these impacts are more consistent and widespread on the north side of the site. On the south side, areas that were filled last, these impacts are not as widespread.

2.3.2 Parcel A and North Side of Parcel B Areas of Concern

The northern side of the Site contains AOC-1, AOC-2, AOC-5, AOC-6, AOC-12 (split into AOC-12E, 12W, and 12N), AOC-14 and AOC-15. Each AOC was previously investigated for soil, sediment, and porous media. Findings of the investigation for the above AOCs are provided below:

AOC-1 Station B

- Station B will be abated of hazardous building materials and then demolished during the performance of remedial activities at the Site.
- Analysis of soil samples beneath the structure identified arsenic at concentrations that exceed the I/C DEC and these impacts will be rendered inaccessible.

AOC-2 Station B Former UST Area

- Four petroleum USTs were previously removed from this area in 2002 and a remedial excavation was performed to remove impacted soil. Post excavation soil sampling identified petroleum impacts.
- Analysis of soil samples did not identify concentrations of petroleum hydrocarbons or VOCs above remedial criteria. PAHs were identified at concentrations above remedial criteria but are associated with Site-wide fill material.

AOC-5 Bulkhead PCB Remediation Area

- In 1998, oil-impacted soil was identified within this area after a section of the bulkhead constructed around the Site gave way. The bulkhead was repaired, and soil was excavated and removed.
- Weston & Sampson collected surficial soil samples to assess potential impacts from tracking. Deeper soil samples were collected from select boring locations to confirm the previous excavation was successful in removing impacted soil. Analysis of soil samples did not identify concentrations of petroleum hydrocarbons or PAHs above remedial criteria.

AOC-6 Capacitor Release/Outdoor Capacitor Banks 1-3

- Non-PCB impacts were not present in AOC-6.

AOC-12E

- AOC-12E (PCB Area 6.2) is located within the northeastern portion of the Site in an area

historically used for coal storage. Weston & Sampson performed investigation in an area where petroleum-impacted soil was previously identified and delineated these impacts.

AOC-12N Former Coal Storage

- AOC-12N is located south of Station B. Petroleum-impacted soil was identified in a historical soil boring within this area.
- Analysis of soil samples did not identify petroleum impacts above remedial criteria.
- PAHs and arsenic were detected above remedial criteria in two soil samples collected at depth and are associated with Site-wide fill.

AOC-12W

- ETPH concentrations that exceed applicable remedial criteria may be rendered inaccessible and no additional sampling or remediation will be required.
- PAHs and arsenic were detected above remedial criteria in multiple soil samples. The detected concentrations appear to be associated with Site-wide fill or former coal storage.

AOC-14 Cooling Water Tunnel

- AOC-14 consists of a former Cooling Water Discharge Tunnel that is located within the North Side of the Site. Weston & Samson performed sediment and porous media sampling in the tunnel every 10 feet, where accessible, to characterize potential impacts.
- Sediments were found to be impacted with petroleum hydrocarbons, PAHs and remediation is anticipated to mitigate these materials. Impacts to concrete were less than applicable remedial criteria and concrete can be left in place and rendered inaccessible.

AOC-15 Oil Stained Area North of English Station / Release to Catch Basin 4

- AOC-15 is located adjacent to and north of the English Station building. During demolition and asbestos abatement of the building in 2011 and 2012, spillage and subsequent tracking resulted in a large oil stain on pavement adjacent to the north side of the building. Catch Basin 4 is located within the oil stained area.
- Elevated concentrations of petroleum hydrocarbons were identified in two soil samples above remedial criteria, but these impacts are sufficiently delineated to plan remediation. PAHs were also detected above remedial criteria at one of these locations, but the PAHs are part of the impacted Site-wide fill.
- Analysis of a sediment sample collected from catch basin CB-4 identified arsenic and lead at concentrations above remedial criteria.

2.3.3 South Side Parcel B Remediation Areas

The southern side of the Site consists of AOC-3, AOC-7 through AOC-11 and AOC-13. Major findings of the investigation for the above AOCs are provided below:

AOC-3 Former Septic Systems

- AOC-3 includes two former septic system locations within the south side of the Site. Historic

maps depict the locations of the historic septic structures; one located on the western side of the Site (Septic West) and one along the eastern side of the Site (Septic East).

- Weston & Sampson advanced soil borings and collected porous media (concrete and asphalt) samples within the area of Septic West and East. Sediment samples were also collected within each structure. PAH and metal impacts to soil and sediments exceeding applicable remedial criteria were identified.

AOC-7 Former Waste Oil Aboveground Storage Tank (AST) / Oil Pump Room Area

- AOC-7 is located within the southeastern corner of the Site. A former waste oil AST was located adjacent to the southeastern corner of the English Station building. An oil pump house that serviced the building boiler system was also located in this area. Numerous soil borings were advanced throughout AOC-7. Porous media (concrete and asphalt) samples were also collected at boring locations and from concrete pads and pipe trenches. Sediment samples were also collected from manhole structures and pipe trenches.
- Historical and recent data have found evidence of ETPH releases to this area of the Site.

AOC-8 Former Fuel Oil ASTs

- AOC-8 is located within the southern portion of the Site. One 50,000-gallon No. 6 fuel oil AST was previously located within a concrete containment berm located in the far southern end of the Site. To the west of the former No. 6 fuel oil tank, there were two 5,000-gallon No. 2 fuel oil ASTs that were formerly located in concrete cradles.
- Weston & Sampson advanced soil borings, collected surficial soil samples, and porous media samples (concrete and asphalt) throughout AOC-8. Sediment samples were also collected from pipe trench and sump structures within the AOC. Petroleum hydrocarbon impacts were not identified in soil but identified in sediment.

AOC-9: Transformer Areas

- AOC-9 is located within the southwestern portion of the Site, to the west of the English Station building. Multiple historic transformers and capacitors were in this area. Numerous soil borings were advanced throughout AOC-9 and porous media (concrete and asphalt) samples were also collected at boring locations and from concrete pads and pipe trenches. Sediment samples were also collected from manhole structures and pipe trenches throughout the AOC.
- Historical and current data have identified releases of petroleum hydrocarbons from historical Site operations.

AOC -10 Former Interior Chemical Storage Areas

- AOC-10 is comprised of outbuildings located within the southwestern and southern portions of the Site associated with former interior chemical storage. Weston & Sampson advanced soil borings, collected numerous porous media (concrete) samples, and one sediment sample within AOC-10.
- Limited impacts to shallow soil beneath the buildings were identified.

AOC -11 On-Site Fill Material: Evaluation of Tracking

- AOC-11 is fill material located throughout the Site. The fill material has been adequately

characterized by others during previous investigatory efforts. This investigation included evaluation of tracking across pads/structures not captured by other AOCs. Weston & Sampson collected three porous media (concrete) samples from concrete pad structure P12 located in the southwestern portion of the Site. There was no sediment observed within the manholes of this structure and therefore, samples were not collected.

- Results of the investigation indicate surface concrete at structure P12 is not impacted. The data obtained from across the Site do not indicate that tracking of the COCs that are the focus of this RAP is an issue that needs to be addressed as part of the remedial actions.

AOC -13 Former Wastewater Treatment System

- AOC-13 is located within the southeastern portion of the Site, east of the English Station building and includes remnants of a former wastewater treatment system (primarily concrete pads). The operational history of this former treatment system is not well documented in historic reports. Weston & Sampson advanced soil borings and collected porous media samples (asphalt and concrete) throughout AOC-13. Sediment samples were also collected from pipe trenches in this area.
- Field screening of soil samples and results from the laboratory analysis of the soil samples indicate that releases of petroleum hydrocarbons have occurred during historical Site operations and these impacts will require remediation. Analysis of sediment samples identified ETPH in sediments collected from trenches likely from releases during historical Site operations.

2.4 Conceptual Site Model

Based on the review of Site history and investigations, Weston & Sampson has developed a Conceptual Site Model (CSM) for non-PCB Site impacts. The primary source for non-PCB impacts is the use of dredged sediments to construct Ball Island. To a more limited extent, releases from operations at the power plants (i.e., Station B and English Station) have also led to impacts at the Site. The nature and extent of these operations-related releases are summarized in the Weston & Sampson North Side Investigation Summary Report and the South Side Investigation Summary Report (Weston & Sampson, January 2018 and March 2018, respectively). The North Side Investigation Summary Report is attached electronically in Appendix A and the South Side Investigation Summary Report is attached electronically in Appendix B.

Soil sampling data was used to determine if a release to the environment occurred at the Site. As noted in Section 2.3, tracking of COCs was identified as a potential release mechanism at this Site, however, the results of sampling did not confirm this as an actual release mechanism. Non-PCB COCs were identified within specific areas of concern and are associated with specific releases or historical practices. Stormwater, cooling water and wastewater transported impacted soil/sediment within associated water conveyance structures (e.g., tunnels, trenches) was also determined to not be a current significant release mechanism because these water tunnels and trenches no longer discharge to the environment. Additional transport mechanisms, such as erosion from wind and precipitation were not found to be significant at the Site.

3.0 REMEDIAL ACTION PLAN

This section outlines the plans and procedures to be implemented for the remediation of COCs other than PCBs in soils at the Site. Planned non-PCB impacted soil remediation activities will be completed in accordance with the requirements of Connecticut's RSRs. Details regarding the remedial objectives, scope, and sequence of remediation are provided below.

3.1 Remedial Objectives and Approach

Remediation of PCB impacts will be completed and confirmed through the collection of confirmation samples in all areas to be remediated for other COCs at the site. Following the remediation of PCBs, the approach of the proposed remedial action for other COCs is:

- In areas where grades are to be maintained at current elevations, soil will be excavated to depths such that the impacted soil beneath will be rendered inaccessible following site restoration.
    - Excavated soil from excavations performed to address other COCs will be transported offsite for appropriate disposal.
- To maintain the asphalt paving and soil barriers in perpetuity, an environmental land use restriction (ELUR) will be applied to the barrier areas. The ELUR will also restrict future site use to industrial/commercial use.
- Barrier placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement will render soil exceeding the I/C DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32)(A) and (B). These barriers will be constructed over nearly all of Parcel A and the northern portion of Parcel B. Barriers will also be constructed over large portions of Parcel B.
- Petroleum impacts to soil that are likely from releases due to site operations will also be rendered inaccessible. When the petroleum impacts are found above the seasonal high water, which is approximately three feet below the ground surface over much of the site, and analytical results indicate that the GB PMC is also exceeded, additional excavation will be performed.

These remedial objectives will be achieved by the following approach detailed further in this report. The elements of the overall approach to remediation of soils at the Site include:

- Preparation of remedial plans and permits;
- Site preparation and establishment of temporary facilities, including Site security, signage and erosion and sedimentation controls;
- Excavation and off-Site disposal of non-PCB-impacted soil;
- Collection of verification soil samples for non-PCB-impacted soil, analysis to confirm the limits of soil remediation;
- Preparation of sub-grade by shaping the Site soils to provide a 2% grade for surface drainage;
- Construction of soil and soil/asphalt barriers to render soils inaccessible;
- Final restoration of soil excavation areas; and
- Recording ELURs on the land records.

This remedial plan focuses on the remediation of non-PCB-impacted areas only. PCB remedial actions to be performed at the Site are described in a separate plans to be executed prior to the implementation of non-PCB remedial actions.

3.2 Remedial Planning

The following sections summarize anticipated planning tasks to be performed prior to implementation of the remedial action.

3.2.1 Permits

The following permits and approvals from federal, state and local government agencies may be required for Site remediation and obtained by the remedial contractor:

- Connecticut Department of Energy & Environmental Protection (CTDEEP) General Permit for Discharge of Groundwater Remediation Wastewater Directly to Surface Water.
- CT DEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.
- Stormwater Pollution Control Plan
- City of New Haven Coastal Site Plan Review
- City of New Haven Building Permits.
- City of New Haven Demolition Permits.

Permit application signature pages for permit applications already submitted are included in Appendix C.

3.3 Public Notification

In accordance with the PCO and the RSRs, public notice for these activities is required. In accordance with CGS Section 22a-134a(i), TRC, on the behalf of UI, will provide public notice of the intent to remediate. The methods of public notice will include the following:

- Public notice will be published in a local newspaper having substantial circulation in the area affected by the Site.
- Notification will be issued to the director of the City of New Haven Health Department.

A sign will be erected on the Site (at least 30 days prior to the start of remediation activities) and contain the text prescribed in CGS Section 22a-133x. Proof of the published public notice and a picture of the sign posted is provided in Appendix D.

3.4 Site Preparation and Temporary Construction Controls

3.4.1 Site Security

Existing Site fencing will be maintained and access from Grand Avenue restricted to authorized personnel via gates. The existing fencing and island location of the Site will restrict access to the Site and limit trespassing. In areas where the steel bulkhead provides a shore barrier, no additional barriers are required. Repairs to the existing fencing and gates will be made before and during the construction

project, as needed.

3.4.2 Erosion and Sedimentation Controls

Erosion and sedimentation control measures will be implemented prior to any on-Site earthwork to prevent the migration of soils from the Site. The primary source of potential soil will be the stockpile(s) of impacted soil that will temporarily exist on-Site prior to on-Site relocation or off-Site shipment for disposal.

Stockpiles will be constructed in a manner to contain and secure the material and prevent contact of the stockpiled material with the ground beneath it or release of any stockpiled material to the surrounding area. Soils will be stockpiled on and covered by plastic sheeting, which will be anchored with sandbags or other materials to contain the soils and minimize potential exposure. Hay bales may be placed around areas used for stockpiling to prevent the migration of contaminated soil from the stockpile. The remedial contractor will also install and maintain catch basin protection to prevent sediment migration.

3.4.3 Dust Monitoring

Dust monitoring for total particulate emissions and fugitive dust within work areas and at the Site perimeter will be implemented during soil excavation and soil handling activities to reduce potential exposures to on- and off-Site receptors during remediation. Monitoring will be conducted continuously using real-time measurement equipment, and the results will be reviewed by the oversight engineer and remedial contractor to determine the extent of dust controls required. At a minimum, dust controls will include the use of windscreens on temporary fencing and use of polyethylene sheeting over temporary stockpiles. If necessary, active dust controls, such as wet spraying will also be deployed to reduce fugitive dust emissions and meet applicable National Ambient Air Quality Standards for particulate matter (PM).

3.4.4 Debris Removal

Areas of the Site requiring debris removal include areas of metal debris, wood debris, and a trailer. These materials will be relocated on-Site by the remediation contractor or appropriately disposed of/recycled. As appropriate, dust controls will be implemented during the movement of debris.

3.4.5 Clearing and Grubbing

Vegetation in remedial areas requiring removal will be cleared and grubbed by the remedial contractor. These areas are located along the East Branch Mill River and West Branch Mill River. The remedial contractor will remove of stumps and roots and properly dispose of these materials. The clearing and grubbing of PCB-impacted areas will be performed under separate RAPs and will be completed prior to the implementation of non-PCB remedial actions.

3.4.6 Remediation Sequencing

Non-PCB remediation work will proceed after the completion of remedial activities described in the PCB RAPs are completed. The non-PCB remediation work will be sequenced as follows:

a) Permitting and submittals;

b) Installation/repair of construction fencing, wind screens, signage, and erosion controls;
c) Temporary water, and if needed electric, utility service;
d) Dust controls and monitoring;
e) Debris removal and clearing and grubbing;
f) Excavation of non-PCB impacted soil with proper off-Site transport and disposal;
g) Subgrade shaping of polluted soils being rendered as "Inaccessible Soil";
h) Render polluted soil exceeding the I/C DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32)(A) and (B) by placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement;
i) Site restoration and demobilization; and
j) Implementation of deed restriction (ELUR).

3.5 Soil Excavation

The remedial approach includes construction of soil and soil/asphalt barriers as described in Section 3.9. To achieve the proposed final elevations, shaping of the surface of polluted soil to remain will be performed to promote drainage. Excess soils will be generated that will be impacted with non-PCB COCs. All excess soil will be removed and disposed off-site.

The remedial contractor will characterize, transport and dispose of surplus soils at a permitted disposal receiving facility. Site soils requiring disposal will be accompanied with proper disposal documentation. Based on the excavation limits identified, remediation will require the removal of 23,500 cubic yards of non-PCB impacted soil to meet the elevations for barrier construction.

The soil and soil/asphalt barriers will include excavation and surface shaping to achieve sub-grade conditions above which the demarcation layer and soil and soil/asphalt barriers will be constructed. In the soil/asphalt barrier areas, the surface asphalt layer will be milled and disposed of/recycled off-Site and no asphalt/bituminous paving fragments will be allowed to be used or incorporated into fill on the Site. The subgrade of the soil/asphalt barrier will be 27 inches below final grades. To achieve this cut, excavation will be performed of on-Site soils. Please refer to Section 3.9.3 and Section 3.9.5 for details of the construction of the soil barrier and soil/asphalt barrier, respectively.

3.6 Post-Excavation Verification Sampling

Discrete soil samples will be collected from the excavations to evaluate whether the remaining soil complies with the remediation objectives. The soil samples will be collected from the excavation sidewalls at an approximate frequency of one sample per 20 linear feet of sidewall and every two feet of depth, with a minimum of one sample collected per sidewall. Soil samples will be submitted for arsenic, PAHs, and ETPH.

The engineer overseeing the remediation will field screen the soils for VOCs using a photoionization detector (PID) and inspect the soil for evidence of contamination. The soil samples will be collected into pre-preserved sample containers provided by the laboratory, stored in iced coolers, and transported via courier to the laboratory for analysis. The analytical laboratory selected for this project will be a State of Connecticut-certified public health laboratory. For quality assurance/quality control (QA/QC) purposes,

one trip blank per cooler and one duplicate soil sample per 20 samples will also be collected for laboratory analysis. To minimize risks associated with personnel entering open excavations, the soil samples will be collected using the bucket of the excavator or backhoe, as necessary.

3.7 Waste Management

Wastes generated during the implementation of this Partial RAP will be properly disposed of in accordance with applicable federal, state and local regulations. This section describes the anticipated non-PCB wastes.

3.7.1 Soil

Non-PCB-impacted soils will be excavated and those soils that cannot be relocated on-Site will be properly disposed of off-Site. These surplus soils will be characterized for the analytical parameters and at a sampling frequency required by permitted receiving facilities. The results of the waste characterization will be used to determine the proper receiving facility and disposal method. Disposal documentation (i.e., waste manifests) will accompany each truckload of surplus soil. Receiving facilities will return weight slips and disposal documentation which will be included in future reports to the CT DEEP.

3.7.2 Dewatering Effluent from Excavations

Groundwater depths at the Site range from 3 to 5 feet below ground surface. Depth of excavation may intercept the groundwater table and require dewatering. To manage dewatering fluids, the remedial contractor will pump dewatering fluids to fractionation tank(s) for treatment. Treatment and discharge will be in accordance with effluent standards set by CT DEEP for discharge to a surface water body. The remedial contractor will obtain a general permit for the discharge of groundwater remediation wastewater to a surface water body from CT DEEP. Based on analytical data, treated dewatering fluids meeting discharge limits will be discharged to surface water. Treated dewatering fluid discharges will be performed per the requirements of the discharge permit obtained from CT DEEP.

3.8 On-Site Soil Handling

Relocation of non-PCB polluted soil will not be permitted. Shaping and grading of polluted soil being rendered as “Inaccessible Soil” will be performed to establish the subgrade elevations needed to place soil and soil/asphalt barriers to the grades shown on the drawings and promote surface drainage. Once compaction and sub-grade elevations have been achieved, the remedial contractor will begin Site restoration tasks detailed in the next section.

3.9 Site Restoration

This section describes the remedial contractor’s Site restoration activities. These activities include installation of barrier components, backfilling excavations, and final surface restoration activities detailed below.

3.9.1 Installation of Demarcation Barriers

An orange demarcation layer will be applied to the soil and asphalt barrier areas. Orange demarcation

layers serve as a visual warning to potential future contractors indicating impacted soils are present at depth. The demarcation layer will serve as a barrier and will be documented in the ELUR (deed restriction). The orange demarcation layer will be placed above relocated/"native soils" and serve at the sub-grade elevation of the two barrier types.

3.9.2 Backfilling Excavations

Suitable soil fill material is needed to render underlying polluted soil inaccessible with either 4-feet of suitable soil or 2-feet of suitable soil with 3-inches of bituminous concrete pavement. The following discussion provides a description of the soil materials that will be deemed acceptable and the methods that will be used to ensure quality control for these soil materials.

Excavated areas below the groundwater table will be backfilled with Non-Polluted Soil only as specified herein to the average groundwater table elevation (approximately elevation 4 ft bgs) or as required by the Engineer. Fill and backfill above the groundwater table will be with Non-Polluted Soil and Natural Soil. Other soil materials used in Site restoration (e.g., screened soil materials, topsoil, gravel, crushed stone) will meet the gradation requirements in the technical specifications and chemical concentrations specified for Non-Polluted Soil.

The remediation contractor will be required to sample imported soil materials (i.e., Non-Polluted Soil or Natural Soil) and other soil materials to be used as specified in the Contract Documents (e.g., screened soil materials, topsoil, gravel, crushed stone.) that are proposed for use at the Site for chemical testing at a frequency of 1 sample per 500 cubic yards. Contractor will submit samples to an approved, independent laboratory certified by the Connecticut Department of Public Health for analysis for the following chemical parameters:

a. Petroleum hydrocarbons by the CT DEEP Extractable Total Petroleum Hydrocarbons (ETPH) Method;
b. Volatile organic compounds (VOCs) by EPA Method 8261;
c. Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
d. RSR 15 metals by EPA Methods 6010 and 7471;
e. Pesticides by EPA Method 8081; and
f. PCBs by EPA Method 8082 with soil extraction by EPA Method 3540.

All analytical testing procedures will conform to Connecticut's Reasonable Confidence Protocols (RCPs) and the contractor's consultant will perform a Data Quality Assessment/Data Usability Evaluation as per CTDEEP requirements.

3.9.2.1 Non-Polluted Soil

Non-Polluted Soil shall be granular, well-graded friable soil; free of sediment, asphalt fragments, rubbish, debris, wood, glass, concrete, metal, bricks, ice, snow, tree stumps, roots, clay, organic matter and any non-soil deleterious material; with 25 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or three (3) inches, whichever is smaller. Soil material acceptable for use shall be classified as GM, GC, SM or SC according to the Unified Soil Classification System and shall have a plasticity index of less than 10.

Chemical properties for all soil materials must meet the following specifications for chemical concentrations to be classified as Non-Polluted Soil:

a. Soil defined as unconsolidated geologic material overlying bedrock, but not including sediment, and not affected by a release of a substance. A Release is defined as any discharge, spillage, uncontrolled loss, seepage, filtration, leakage, injection, escape, dumping, pumping, pouring, emitting, emptying, or disposal of a substance. A Substance is defined as an element, compound or material, which when added to air, water or soil or sediment may alter the physical, chemical, biological or characteristic of such air, water, soil or sediment. Sediment is defined as unconsolidated material occurring in a stream channel, estuarine waters, or marine waters. (Reference Connecticut Regulation of State Agencies 22a-133k-1(a) – Definitions)
b. No detectable concentrations of petroleum hydrocarbons as determined by CT DEEP ETPH Method with laboratory reporting limits less than the Analytical Detection Limit (ADL), Residential Direct Exposure Criteria (RDEC) and the GA PMC;
c. No detectable concentrations of VOCs by EPA Method 8260 with laboratory reporting limits less than the ADL, RDEC or the GA Pollutant Mobility Criteria (PMC) for each analyte;
d. No detectable concentrations of SVOCs by EPA Method 8270 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte;
e. Concentrations of RSR 15 metals by EPA Methods 6010 and 7471 less than the lower of the ADL, the High Range Background Concentration (see table below for metals concentrations) and the GA PMC by SPLP Method for each metal;
f. No detectable concentrations of pesticides by EPA Method 8081 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte; and
g. No detectable concentrations of PCBs by EPA Method 8082 with laboratory reporting limits less than the ADL, RDEC or the GA PMC by SPLP Method.
h. The RDEC is the Residential Criteria provided in Appendix A and the GA, GAA Mobility Criteria (GA PMC) provided in Appendix B of the Regulations of Connecticut State Agencies, Section 22a-133k-1 through -3, inclusive.
i. Soil will be analyzed for each analyte for which an RDEC and GA PMC is provided.

Background Metals Concentrations

Metal	High Range Background Concentration (mg/kg)
Antimony	ND
Arsenic	5.4
Barium	800
Beryllium	3.5
Cadmium	0.3
Chromium	8.5
Copper	93
Lead	32
Mercury	0.08
Nickel	40
Selenium	49
Silver	0.83
Thallium	1
Vanadium	157
Zinc	130

ND – Not detected above laboratory reporting limits.

Source: Background concentrations for Connecticut Mesozoic Basin soils from Brown and Thomas, "Major and Trace Element Geochemistry and Background Concentrations for Soils in Connecticut," Northeastern Geoscience, Volume 32, 2014.

3.9.2.2 Natural Soil

Suitable fill listed as Natural Soil shall conform to the definition of Natural Soil as defined by the CTDEEP Solid Waste Regulations Section 22a-209-1, "Natural Soil" means soil in which all substances naturally occurring therein are presented in concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable. For the purpose of this definition, substance shall have the same meaning as in section 22a-133k-l of the Regulations of Connecticut State Agencies. Soil materials that do not meet the specifications for chemical concentrations to be classified as Non-Polluted Soil may be used onsite as Natural Soil as long as all of the metals conform to the following table that specifies the lower of the site background metals concentration and the RDEC. Metals must also conform to the GA PMC by SPLP method. In addition, all of the other substances (non-natural) must comply with the requirements of Non-Polluted Soil.

Natural Soil Metals Concentrations

Metal	Concentration (mg/kg)
Antimony	4
Arsenic	10
Barium	320
Beryllium	2.0
Cadmium	5
Chromium	72
Copper	760
Lead	400
Mercury	4
Nickel	70
Selenium	15
Silver	1
Thallium	5
Vanadium	390
Zinc	1,000

ND – Not detected above laboratory reporting limits.

Only non-polluted soil will be used to backfill excavations below the groundwater surface which averages approximately four ft bgs. All backfill materials will be placed and compacted in one-foot lifts and compaction to 90% of the modified proctor density will be required.

3.9.3 Construction of Soil Barriers

The area of soil barriers is depicted on Figures 6 and 7. The soil barrier will include four feet (48 inches) of tested and approved suitable soil above the orange demarcation layer and the underlying shaped polluted soil being rendered as “Inaccessible Soil”. The top six inches of the soil barrier will be loam. This loam layer will be seeded, and grass will be used to establish a vegetated turf layer. This turf, once established, will limit erosion.

The surface grade of the soil barrier will be graded to maintain a minimum of 12 inches of exposed steel bulkhead at the edge of the island. In this way, the soil barrier will be fully contained within the steel bulkhead and not overtop the bulkhead. The four-foot thick soil barrier will render the covered underlying polluted soils ”"Inaccessible Soil”.

3.9.4 Establishing Turf

As noted above, the soil barriers will be finished with a surface application of six inches of loam and seed to establish turf. Hydro-seeding of a seed mix suitable for the Connecticut climate will be applied

to the surface loam layer of the soil barriers. The turf root system will limit erosion of the soil barriers. Please refer to Figures 6 and 7 for a graphical depiction of the soil barrier areas to be finished with turf.

3.9.5 Soil/Asphalt Barrier

The remedial contractor will construct a soil/asphalt barrier in areas shown on Figures 6 and 7. As noted in Section 3.5, existing paving will be milled, and this material transported off-Site for proper disposal/recycling. Existing polluted soils will then be excavated to 27 inches below final paved elevations. The soil/asphalt barrier will then consist of the orange demarcation layer overlain by 24 inches of compacted, tested, and approved suitable soil overlain with the 3 inches of pavement. The 24 inches of soil will include approximately 15 inches of compacted sub-base overlain with 9 inches of compacted base material. The surface will include 3 inches of bituminous pavement. The soil/asphalt barrier will render underlying polluted soils, "Inaccessible Soil".

3.10 Equipment Decontamination

All materials and equipment used in the excavation of PCB-impacted soil will be decontaminated using appropriate procedures prior to use in the remediation of non-PCB impacted soil. Heavy equipment involved with the handling of non-PCB-impacted soil will be decontaminated prior to being removed from the Site. Solid wastes derived from excavation or decontamination will be placed with contaminated soil or containerized for appropriate off-Site disposal. Wash water from the decontamination of equipment will be collected and pumped to an on-Site temporary storage tank. The accumulated wash water will be sampled for disposal characterization analysis and transported and disposed of off-Site based on the characterization data, or alternatively, the water will be pumped to and treated through a temporary on-Site treatment system and discharged under a temporary dewatering permit (see Section 3.7.2).

3.11 Inspection and Monitoring Procedures During Construction

The excavation contractor will be required to keep daily logs of Site activities including estimates of the amount of soil moved during the day, as well as the personnel and equipment on-Site. The excavation contractor will submit copies of logs to the engineer overseeing the work at the beginning of each week. The contractor will provide the waste disposal documentation to the oversight engineer upon receipt.

The oversight engineer will maintain daily logs and photographic documentation of the activities conducted. Daily logs will document personnel present on-Site, general Site conditions at the beginning and end of the Site work conducted that day, inspection of erosion and sediment control measure, number of trucks loaded for disposal, and samples collected and sent to the laboratory. All documentation will be included in the final Remedial Action Report (RAR).

3.12 Post-Remediation Reporting

The remediation oversight engineer will prepare reports to document the implementation of this Partial RAP. The RAR will include a summary of completed remedial actions including volume of excess non-PCB-impacted soils and disposal documentation. The oversight engineer will summarize the confirmatory sampling activities and results. If expanded soil excavation activities were performed based on confirmatory sampling results, those details will be summarized in the RAR. The soil and soil/asphalt

barrier construction will also be documented. The oversight engineer will also note, if present, significant deviations from the proposed final grades in the RAR report.

4.0 LIMITATIONS

This Remedial Action Plan was prepared for the use of UI, exclusively. The findings provided by Weston & Sampson in this report are based solely on the information reported in this document. Future investigations, and/or information that was not available to Weston & Sampson at the time of the investigation, may result in a modification of the findings stated in this report.

Should additional information become available concerning this Site or neighboring properties which could directly impact the Site in the future, that information should be made available to Weston & Sampson for review so that, if necessary, conclusions presented in this report may be modified.

The conclusions of this report are based on Site conditions observed by Weston & Sampson personnel at the time of the investigation, information provided by UI, and samples collected and analyzed on the date shown or stated in this report. This report has been prepared in accordance with generally accepted engineering and geological practices. No other warranty, express or implied, is made.

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FIGURES

TABLES

APPENDIX A

North Side Investigation Summary Report

APPENDIX B

South Side Investigation Summary Report

(Reports Provided on Disc

APPENDIX C

Permit Application Signature Pages

APPENDIX D

Public Notice Documentation

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

Weston & Sampson, on behalf of United Illuminating (UI), has prepared this Partial Remedial Action Plan (RAP) for the English Station property located at 510 and 510A Grand Avenue in New Haven, Connecticut (the Site). UI proposes to remediate soil at the Site as required under the Partial Consent Order (PCO - COWSPCB15-001) issued by the Connecticut Department of Energy and Environmental Protection (CT DEEP).

This Partial RAP presents the plans and procedures to be implemented for the remediation of soil containing Chemicals of Concern (COCs) other than polychlorinated biphenyls (PCBs) at the Site. However, the English Station Building and the large transformer at the northwest corner of the building are outside the limits of work for this partial RAP. The soil beneath the building and transformer will be remediated under a separate RAP. Thus, this remedial plan is partial in that it does not include the entire site. Remediation of PCBs in soil are being addressed under separate remedial plans (English Station Parcel A PCB Soil Remedial Action Plan and Parcel B PCB Soil Remedial Action Plan, Weston & Sampson, August 2019). PCB remedial actions will be completed within each remediation area prior to the implementation of this RAP.

The Site occupies approximately 9-acres of land located south of Grand Avenue in the City of New Haven. The Mill River borders the Site to the east, west, and south. UI operated electrical generating facilities on the property between 1929 and 1992. The Site location, surrounding area, and significant Site features are depicted on Figures 1 and 2.

Historically, the Site was constructed using dredged sediments as described in the "Request for Widespread Polluted Fill Variance," Advanced Environmental Interface, January 10, 2003. The variance was approved for the Site by the CT DEEP in a letter dated March 27, 2003.

Between July and September 2017, Weston & Sampson performed investigations to evaluate soil, groundwater, and porous media (concrete, wood, and asphalt) conditions. The analytical data generated during these Site investigations and other historical investigations has been used to develop the remedial actions described in this plan.

The COCs at the Site being addressed under this RAP include metals, primarily arsenic, extractable total petroleum hydrocarbons (ETPH), and the Semivolatile Organic Compounds (SVOCs) known as polyaromatic hydrocarbons (PAHs). Analytical testing was done at the Site for Volatile Organic Compounds (VOCs) and other SVOCs but remediation for these chemicals is not required based on the lack of evidence of releases to the subsurface as determined through the investigative process.

As noted above, the design for remediation of PCBs in soil is discussed in two separate RAPs. Remedial work at the Site will be phased such that PCBs remediations are completed prior to remediation of other COCs.

The remedial goals for the COCs at the Site as identified above that are germane to this RAP:

- Include rendering soil exceeding the Industrial/Commercial Direct Exposure Criteria (I/C DEC) inaccessible by constructing barriers consisting of an orange demarcation layer and either four

(4) feet of soil completed with grass or two (2) feet of backfill completed with three (3) inches of bituminous concrete;

- Assume that an Industrial/Commercial Environmental Land Use Restriction (ELUR) will be placed on the Site and that residential criteria will not be applicable; and
- Take into account that, for the Pollutant Mobility Criteria, the widespread polluted fill variance provides for compliance with these criteria unless the impacts are due to a release from Site operations after the fill was placed. No soils impacted by releases from site operations with COCs exceeding the GB PMC were identified.

This non-PCB RAP describes the measures to be implemented to achieve these remedial objectives.

This RAP includes the use of Environmental Land Use Restrictions (ELURs) to achieve remedial goals as well. The current and any future owners are obligated, in accordance with Consent Order COWSPCB 16-001, to comply with any and all ELURs recorded on the land records.

1.0 INTRODUCTION

Weston & Sampson, on behalf of United Illuminating (UI), has prepared this Partial Remedial Action Plan (RAP) for the English Station facility, a former electric power plant located at 510 and 510A Grand Avenue, New Haven, Connecticut (the Site). This RAP presents the plans and procedures to be implemented for the remediation of soil containing Chemicals of Concern (COCs) other than polychlorinated biphenyls (PCBs) at the Site. Remediation of PCBs are being addressed under separate remedial plans (Parcel A and Parcel B) that will be implemented prior to this non-PCB RAP. UI proposes to remediate the Site as required under the Partial Consent Order (PCO COWSPCB15-001) issued by the Connecticut Department of Energy and Environmental Protection (CT DEEP).

The English Station Building and the large transformer at the northwest corner of the building are outside the limits of work for this partial RAP. The soil beneath the building and transformer will be remediated under a separate RAP. Thus, this remedial plan is partial in that it does not include the entire site.

1.1 Site Location & Description

The Site consists of 9-acres of land located on a man-made island (Ball Island) situated within the Mill River which Flows north to south into the Long Island Sound. The Site has been split into two parcels (Parcel A and Parcel B), which are owned by two separate entities. The island is retained via steel bulkhead which surrounds the Site to the east, west, and south. The Site location is shown in Figure 1 – Locus Map. Geographic coordinates for the Site are:

Latitude/Longitude:	41° 18’ 23" North/72° 54’ 24" West
UTM Coordinates:	Zone 18 675,239.9 meters Northing 4,574,883.6 meters Easting

The north side of the Site as depicted on the figures, which includes Parcel A and the north side of Parcel B, consists of an area of approximately 3.6 acres. This portion of the Site is developed with a two-story former electrical generating plant, referred to as Station B. In addition to Station B, the north side of the Site also includes former locations of concern including the coal bin storage area, a storm water surge basin, cable houses, and a subsurface cooling water tunnel which formerly discharged water from Station B to the Mill River.

The south side of the Site as depicted on the figures, which includes the south side of Parcel B, consists of the remaining 5.3 acres of land located at the southern tip of Ball Island. Several structures currently stand within this portion of the Site, including the former English Station power generating plant. Of the 5.3 acres of land in the southern side of the Site, the former power plant foundation encompasses approximately 2.3 acres. Other buildings within this portion of the Site include a former assembly hall, storage building, and a foam house.

1.2 Site Background

The Site was first occupied by Enos S. Kimberly and Company in the late 1880s and was utilized as a coal and lumber facility. In 1890, New Haven Electric Company purchased the Site and began the

construction of Station B. As part of this construction, Ball Island's footprint was expanded via the filling of the portion of the Mill River south of the Site. Station B reportedly operated as a coal-fired power plant until 1903.

UI purchased the property in 1914 and began the construction of the English Station Power Plant in 1924. The initial construction consisted of coal-fired, low-pressure boiler and turbine areas, which were completed in 1929. Sometime between 1948 and 1952, two additional coal fired, high-pressure boilers and turbines were constructed at the southern end of English Station. At that time, Ball Island was further expanded to the South by the additional filling of the Mill River. The English Station Power plant operated as a coal-fired power plant until sometime in the mid-1950s when the plant was converted into an oil-fired plant. English Station then operated as an oil-fired plant until 1992 when it was placed on deactivated reserve status. In an attempt to preserve interior building conditions, several gas-fired boilers, temperature and humidity controls were installed.

In 2000, UI transferred the Site to Quinnipiac Energy, LLC (QE). At that time, an escrow of $1,900,000 was established by UI to support environmental investigation and cleanup of the Site. From 2000 through 2008, Advanced Environmental Interface, Inc. (AEI) performed environmental assessment activities on behalf of QE. Assessment activities were ceased in 2008, when the escrow funds were depleted. In 2006, prior to depleting the escrow funds, QE filed for bankruptcy and divided the property into two parcels (Parcel A and Parcel B). Subsequently, QE sold Parcel A to Evergreen Power, LLC (Evergreen) and Parcel B to ASNAT, LLC (ASNAT). Parcel A was recently sold to Haven River Properties and Parcel B was sold to Paramount View Millennium LLC.

In 2011, the Site owners at the time (ASNAT and Evergreen) contracted Grant Mackay Company (Grant Mackay) and Classic Environmental, Inc. (Classic Environmental) to demolish the existing on-Site structures with the intention of generating enough money through selling scrap-metal steel to fund the future environmental investigation and eventual cleanup of the Site. The initial focus of this project was at the main English Station power plant building. In 2012, CT DEEP conducted an on-Site inspection which concluded that there was potential for tracking and spreading PCB contamination from source areas to other uncontaminated areas of the Site. In February 2012, CT DEEP issued a Cease and Desist Order (CDOWSUST 12-001) which terminated all on-Site activities. The United States Coast Guard (USCG), issued an Administrative Order, 002-14, on September 19, 2012 to the new Site Owners and to UI as the former Site owner. Actions performed by the USCG included placing booms around the southern end of Ball Island and removal of liquid wastes and drummed materials from the Oil Room because of the potential to discharge to a nearby catch basin.

In July 2017, Weston & Sampson was granted Site access to observe current on-Site conditions. The Site is primarily improved with decaying impervious surfaces (asphalt and concrete), as evident by vegetation growth throughout the Site. Brushy vegetation had been allowed to grow in some areas of the Site and was removed from above the ground surface without disturbing underlying soils/roots to allow access to areas of the Site for the purposes of inspection and carrying out an environmental investigation exterior to the buildings.

1.3 Site Geology and Hydrogeology

1.3.1 Geology

According to the "Surficial Materials Map of the Connecticut," (Stone et al., 1992), the Site is located in an area underlain by fill. The 1998 Phase II/III report by GEI Consultants, Inc., indicates the fill material encountered during their investigation of the Site ranged in thickness from 9 to 16.5 feet and consisted of a variety of granular materials, including loose, poorly sorted sands and silt with fill materials including brick, ash, cinders, wood, glass metal, and plastic fragments.

Per GEI Consultants, Inc., a slightly plastic silt and fine sand layer was encountered beneath the fill layer and generally ranged in thickness from 5 to 11 feet. Numerous mollusk shells, fine roots, and other organic materials were observed in this layer. Occasional 1- to 3- inch thick layers of well-sorted and sub-rounded fine to medium sands were observed interbedded with the siltier portions of this strata. Interbedded fine to medium sand and slightly plastic silts were observed beneath the potential confining layer of slightly plastic silts.

According to the "Bedrock Geological Map of the Connecticut," (Rodgers, 1985), the bedrock beneath the Site consists of New Haven Arkose. This bedrock is described as consisting of reddish, poorly-sorted, coarse-grained, sandstone-like sedimentary rock.

1.3.2 Groundwater

Groundwater at the Site is classified as GB by the CT DEEP, indicating that it is not suitable for human consumption without treatment. Based on previous Site investigations, groundwater is generally observed in shallow overburden fill materials between approximately 3 and 5 feet below ground surface.

Water level measurements indicated that groundwater at the Site is tidally influenced with an approximately 0.5 to 1.0-foot fluctuation between high and low tidal cycles. Groundwater flows at low tide are typically towards the bulkhead. Groundwater flow at high tide depends upon the level of groundwater at the site which can be influenced by recent precipitation.

1.4 Applicable Regulations

Applicable Regulations for the Site remediation for COCs other than PCBs are the Connecticut Remediation Standard Regulation (RSRs) found in the Regulations of Connecticut State Agencies (RCSA), Section 22a-133k-1 through 3, inclusive. It is anticipated that an industrial/commercial (I/C) Environmental Land Use Restriction (ELUR) will be placed on the property in accordance to the requirements of 22a-133q-1 of the RCSA. As such, remediation will be performed to comply with the I/C Direct Exposure Criteria (DEC).

A Widespread Polluted Fill Variance was granted for the Site. Thus, remediation will not be performed to comply with the GB Pollutant Mobility Criteria (PMC) unless it is determined that the COCs present within an AOC are due to a release from Site operations and not from the historical placement of polluted fill.

1.5 ELUR Obligations

This RAP includes the use of Environmental Land Use Restrictions (ELURs) to achieve remedial goals as well. The current and any future owners are obligated, in accordance with Consent Order COWSPCB 16-001, to comply with any and all ELURs recorded on the land records.

2.0 SUMMARY OF SITE INVESTIGATIONS

Several Site investigations have been performed to evaluate the nature and extent of contamination at the Site. This section provides a summary of the investigation activities conducted to characterize the presence of non-PCB COCs. As noted in Section 1.2, soil containing extractable total petroleum hydrocarbons (ETPH), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), and metals has been identified at the Site. Details regarding Site investigation activities and the remedial strategy to address PCBs are provided in separate RAPs for Parcel A and Parcel B.

2.1 2017 Site Investigation

In 2017, Weston & Sampson performed an environmental site assessment as per the TRC Scope of Study dated July 2017. Samples were collected of soil, sediments, porous materials, and tested for PCBs, ETPH, SVOCs, VOCs, and metals. The data from this investigation for all analytical parameters except for PCBs are presented in Tables 1 through 14.

2.2 Historical Site Investigations

The following text is modified text from the TRC Scope of Study dated July 2017. This summary of environmental work was prepared by TRC and condensed by Weston & Sampson to reflect non-PCB historical assessments only relevant to this PARTIAL RAP.

2.2.1 1998 Phase I Environmental Site Assessment, GEI Consultants, Inc. (GEI, 1998a)

In 1998, GEI completed a Phase I Environmental Site Assessment (ESA) on the Site for UI. GEI noted that a 50,000-gallon vertical aboveground storage tank (AST), reportedly used for the storage of No. 6 fuel oil, was observed on the southern portion of the Site, to the south of English Station. In addition to the vertical AST, GEI noted two 5,000-gallon horizontal ASTs, reportedly used for the storage of No. 2 fuel oil, in the same area. All three tanks were located within brick and concrete containment dikes. GEI did not observe stains or leaking associated with the tanks during their Site reconnaissance.

GEI noted the following equipment during their inspection of the Site that may contain non-PCB oils:

- Southern Portion of Coal Handling Area: Three capacitor banks were observed in this area: two of the capacitor banks were reportedly located in a single enclosure at one location; a single capacitor bank was observed in another enclosure; and a third enclosure was observed to be empty. Tags reportedly indicated “No PCBs.”
- Bulkhead, Western, Southern and Eastern Sides: Three cathodic protection relays were observed by GEI along the western, southern and eastern sides of the bulkhead.

In addition to the equipment noted above, GEI observed two tank trucks in the central portion of the former coal handling area that UI personnel reportedly noted contained transformer fluid from the large “G” transformer located at the northwest corner of English Station.

GEI made the following conclusions and identified the following areas of concern at the completion of the Phase I ESA (GEI, 1998a):

- Four underground storage tanks (USTs) were formerly located in an area adjacent to the west side of Station B. According to information obtained from CT DEEP files, two older, 2,000-gallon gasoline USTs were installed at this location and removed in June 1991, when they were both replaced by 1,000-gallon USTs. A CT DEEP spill report noted that a nominal petroleum sheen was observed on the water table during the tank removal, although groundwater samples did not exhibit contamination. The 1,000-gallon USTs were reportedly removed in October 1996 and limited soil and groundwater sampling conducted at that time did not reveal the presence of contaminants.
- A 1967 CT DEEP inspection report (P-5) indicated that the Site was served by six separate septic tanks and associated leaching fields. The report notes that one of the septic systems was noted on a UI Site plan, to the north of the coal conveyor system. The locations of the other septic systems were not indicated by GEI in their report.
- Spill reports on file with CT DEEP identified nineteen separate spills in connection with the Site. Of these spills, roughly half were releases to the Mill River. Several others involved spills or releases of PCB-containing oils to soil or other areas on-Site, but generally did not identify specific locations.
- A waste oil AST was formerly located adjacent to the southeastern corner of English Station.
- One 50,000-gallon No. 6 fuel oil and two 5,000-gallon No. 2 fuel oil ASTs were noted on the southern portion of the Site, adjacent to English Station.
- Several station transformers, large circuit breakers, capacitor banks, and cathodic protection relays were observed across the Site.
- Three former chemical storage areas were identified within English Station, though their exact locations were not described by GEI.
- A former industrial wastewater treatment system was located southeast of English Station. At the time of the 1998 Phase I, the system was no longer present, although GEI noted remnants of the former wastewater treatment system (concrete pads, etc.) present adjacent to the north of the high-pressure boiler discharge point.
- GEI noted that based on their review of historic maps, aerial photographs and other documentation, much of the Site appears to be underlain primarily by fill material of an unknown quality and origin.
- Coal storage operations at the Site, south of Station B, were conducted over an extended period.
- The Site was identified as a Large Quantity Generator (LQG) of hazardous wastes. GEI noted that the Site may be considered an "Establishment" under the Connecticut Property Transfer Act. A 1992 CT DEEP Hazardous Waste Generation Report indicates 13,315 pounds and 966 gallons of hazardous waste were generated during deactivation of the Plant in 1991/1992.

2.2.2 1998 Phase II/III Field Investigation, GEI Consultants, Inc. (GEI, 1998b)

In July 1998, GEI returned to the Site to perform a Phase II and partial Phase III investigation. The purpose of the investigation was to assess soil and groundwater conditions in the AOCs identified in their earlier (May 1998) Phase I. GEI identified the following AOCs for the Site related to non-PCB impacts:

- AOC 2: Station B USTs. Four gasoline USTs were formerly located to along the west side of Station B. Two older 2,000-gallon gasoline USTs were removed from this area in 1991 and

replaced with two 1,000-gallon gasoline USTs. The 1,000-gallon gasoline USTs were removed in 1996. Only limited sampling was completed in this area.

- AOC 3: Former Septic Systems. CT DEEP documentation indicated as many as six septic systems were previously in use at the Site. Only one septic tank was identified by GEI during their review of plans for the Site.
- AOC 4: Past Spills. Several spill reports reviewed by GEI indicated sheens and releases to the Mill River occurred via the storm sewer system on-Site.
- AOC 7: Waste Oil AST/Oil Pump House. A former waste oil AST was identified by GEI as having been located next to the southeastern corner of English Station. An oil pump house that served high-pressure boiler units 13 and 14 was also located in this area.
- AOC 8: Fuel Oil ASTs. One 50,000-gallon No. 6 fuel oil AST and two 5,000-gallon No. 2 fuel oil ASTs were identified on the southern portion of the Site. All three tanks were located within secondary containment dikes; however, GEI noted surficial soil staining outside of the bermed area.
- AOC 10: Former Interior Chemical Storage Areas. Three former chemical storage areas were identified within the Plant building.
- AOC 11: On-Site Fill Material. Historic information reviewed by GEI indicated that much of the Site is underlain by fill material of an unknown origin and quality.
- AOC 12: Coal Storage. The central portion of the Site, south of Station B and north of English Station, housed coal storage and handling operations for an estimated 40-year duration.
- AOC 13: Former Wastewater Treatment Facility. According to GEI, a former wastewater treatment system was in the southeastern corner of the Site. Remnants of the treatment system, including concrete pads and a below grade pumping station, were observed by GEI during the Phase I.

With respect to the documentation of past spills on the Site, AOC-4, GEI noted that many of the spill reports were for evidence of discharges to the Mill River (e.g., sheens, floating product) due mainly to unknown sources. Additionally, several other spill reports were for discreet events or areas of the Site evaluated during the investigation of other AOCs. GEI reasoned that the evaluation of historic spills on-Site would be accomplished through sampling of groundwater monitoring wells across the Site and sediment samples collected from Site drainage structures. As such, no specific discussion was presented relative to an evaluation of AOC-4.

Total petroleum hydrocarbons (TPH) was detected in eleven of the soil samples collected near AOC-8, ranging in concentration from 30 parts per million (ppm) to 35,520 ppm. GEI attributed the TPH and polynuclear aromatic hydrocarbon (PAH) detections in this area to past oil releases or potentially contaminated fill.

The report indicates that GEI evaluated AOC-10 (Former Interior Chemical Storage Areas), located inside of English Station, using monitoring wells and soil borings at exterior locations around the building. Based on the results of their investigation, GEI concluded that the detection of contaminants in the exterior sample locations, particularly TB-108, were likely attributable to releases outside the building or the presence of fill.

GEI addressed AOCs 11 (On-Site Fill Material) and AOC-12 (Coal Storage) together in their Phase II/III report. GEI reported that analytical data for samples collected within the former coal storage area consistently contained contaminants including arsenic, PAHs, and TPH. The detected concentrations of one or more of these constituents often exceeded the applicable RSR criteria.

With respect to Site groundwater, GEI concluded that no VOCs or metals were detected above the applicable RSR groundwater criteria. GEI noted that one up-gradient deep well, MW-04D, contained low levels of solvent-related VOCs that were attributed to an unnamed, off-Site source. Several SVOCs, were detected in on-Site wells sampled during the Phase II/III. GEI attributed the occurrence of these constituents to the widespread fill across the area and not to any one AOC.

In addition to providing the results of their investigation, GEI's report summarizes options with respect to each of the evaluated AOCs. A notable, general conclusion made in the report is that non-aqueous phase liquids (NAPLs) were not observed or encountered at the Site during investigation activities. With respect to AOCs 3 and 4, GEI did not recommend any further work, as no impacts associated with the former septic systems (AOC-3) were identified and contamination attributable to past spills (AOC-4) was addressed by other AOCs.

2.2.3 1999 Preliminary Report #20210: Regarding Supplemental Environmental Investigation at the UI English Station, Enviroshield, Inc. (Enviroshield, 1999)

The Enviroshield 1999 Preliminary Report documented that a continuous oil film and strong petroleum odor was observed on the water table at GP-20A. Small globules of oil and a light petroleum odor were also noted in wells GP-30 through GP-32, GP-38 and GP-39. This area was subsequently remediated following a failure of the bulkhead surrounding Ball Island.

2.2.4 2000 Supplemental Field Investigation, GEI Consultants, Inc. (GEI, 2000b)

In May 2000, GEI completed a supplemental field investigation to further define previously identified areas of contamination on the Site for use in preparation of a Remedial Action Plan (RAP). The supplemental field investigation was based on the results of GEI's earlier Phase II/III investigation of the Site completed in 1998. The supplemental investigation was performed based on the premise that a Site-wide environmental land use restriction (ELUR) would be implemented, restricting land use to non-residential and restricting the disturbance of soil greater than 4 feet below existing grade.

At AOC-8, shallow soil TPH impacts were found adjacent to the east of the former No. 6 fuel oil AST and containment dike during the Phase II/III.

Arsenic concentrations above the applicable RSR criteria were identified in soils throughout AOC-12, the former coal storage and handling area, at depths ranging from 0 - 13 feet below ground surface (ft bgs). According to the report, the source of the contamination is attributed to the former storage/use of coal. Initially during the Supplemental Field Investigation, thirteen soil borings were completed within the former coal storage and handling area specifically to evaluate arsenic concentrations. However, additional arsenic analyses were run on soil samples collected from other nearby areas of the Site to provide a better definition of the extent of arsenic in soils.

Arsenic concentrations more than applicable RSR criteria were detected in soil samples collected from TB-231 through TB-235 and HA-3. Soil samples collected from other adjacent AOCs identified significant arsenic exceedances adjacent to Capacitor Bank 1 and the Southwestern Transformer Area. GEI concluded that the occurrence of arsenic in association with the former coal storage and handling area was "fairly well delineated". GEI did not render an opinion on the other areas of the Site where high concentrations of arsenic were detected in soils, such as Capacitor Bank 1 or the Southwestern Transformer Area.

To further evaluate the former wastewater treatment system (AOC-13) where lead, SVOCs and TPH were previously detected in soils, GEI collected soil samples from five additional soil borings (TB-202 through TB-206) in the area. According to GEI, the concentrations of SVOCs in the soil samples collected from these borings were high enough to indicate the potential presence of NAPL when the calculation presented in Section 22a-133k-2(c)(3) is applied. GEI subsequently concluded that delineation of the SVOC-impacted soil near the former wastewater treatment plant was adequate and noted that remediation of these soils would be required.

2.2.5 2000 Draft Remedial Action Plan, GEI Consultants, Inc. (GEI, 2000a)

The 2000 GEI Draft RAP summarizes environmental investigative work completed up to that point, provides an evaluation of RSR compliance, and presents remedial actions and objectives for several areas of the Site. The RAP presents actions GEI determined were required to bring the Site into compliance with the industrial standards of the RSRs. Remedial actions proposed by GEI in their Draft RAP were based primarily on their earlier Phase I ESA (1998), Phase II/III (1998), and Supplemental Environmental Investigation (2000), summarized previously.

To address contaminants in soil at concentrations above the Residential (RES) Direct Exposure Criteria (DEC), GEI indicated that a Site-wide ELUR would be recorded, allowing compliance with the Industrial/Commercial (I/C) DEC and the groundwater Class GB Pollutant Mobility Criteria (PMC). At those AOCs where contaminants in soil exceeded the GB PMC, excavation to the seasonal high-water table and off-Site disposal was the remedial method specified. Contaminants detected in soil at concentrations above the I/C DEC only would be rendered inaccessible through the placement of 2 feet of clean fill and finishing with three inches of asphalt.

Though SVOCs in soil at the former Station B USTs (AOC-2) and the former wastewater treatment system (AOC-13) were detected at concentrations indicative of potential NAPL, GEI reasoned that recoverable NAPL that requires remediation under Section 22a-133K-2(g) was not believed to be present at the Site for the following reasons:

- A review of the Site history did not indicate the release of any significant quantities of NAPL;
- Free phase NAPL layers had not been detected in any of the monitoring wells at the Site;
- Elevated SVOCs were present in part due to coal ash, not due to the release of liquids containing SVOCs;
- Concentrations of SVOCs in groundwater did not indicate that the presence of NAPL is likely; and

- The equation to predict the presence of calculated NAPL includes a factor of safety and is only one of several general indications that are used to suggest the possible presence of NAPL.

Additionally, GEI noted that no groundwater remediation was required, though continued groundwater monitoring would likely be required to demonstrate compliance with the RSRs, specifically the Surface Water Protection Criteria (SWPC).

2.2.6 2001 Remedial Action Plan for Former Coal Yard Area, Advanced Environmental Interface, Inc. (AEI, 2001)

Shortly after the Site was sold to Quinnipiac Energy (QE), AEI was retained to prepare and implement a RAP for the former coal yard (AOC-12). According to the plan, the former coal yard was being considered for remediation ahead of planned construction activities associated with the potential re-powering of the Site.

AEI's RAP was based solely on previous Site investigations and relied heavily on the early work completed by GEI and Enviroshield. Based on AEI's review of the existing data for the former coal yard, they determined that soil within the former coal yard generally contained concentrations of arsenic above the I/C DEC. Groundwater that contained lead and PAHs above the SWPC was also identified in monitoring wells along the eastern property boundary.

According to AEI's analysis, there was no apparent pattern to arsenic distribution, except that most of the detected arsenic concentrations were in the shallow soils in and around the former coal storage/handling area. AEI acknowledged a "hot spot" in the south portion of the former coal yard, north of the Plant, that had high levels of arsenic. Based on the figures included in the plan, this area appears to correspond with former Capacitor Bank 1.

To achieve compliance with the RSRs, AEI proposed to use planned construction activities to render soils inaccessible (e.g., covered with 2 feet of fill with asphalt barrier or four feet of fill with no barrier) and environmentally isolated (e.g., concrete building floors and pads), record an ELUR to prevent future disturbance of soil, and where necessary, excavate and dispose of contaminated soil. AEI also planned additional sampling across the former coal yard and surrounding area (23 soil borings) and the area around former Capacitor Bank 1 (8 shallow soil samples with hand tools).

2.2.7 2015 Draft Section 4 Subsurface Investigation for the Former English Station, HRP (HRP, 2015)

In 2015, HRP completed a subsurface investigation on behalf of UI to characterize the distribution of soil and groundwater contamination near select AOCs identified for the Site. The subsurface investigation was completed in accordance with a Generalized Scope of Work Plan submitted to the CT DEEP in February 2014. The investigation activities were completed to provide a preliminary evaluation of the distribution of contamination in select AOCs and were not meant to fully characterize the Site. Areas of the Site investigated at this time included the following:

- AOC-1: Station B Building;
- AOC-7: Above Ground Waste Oil Storage Tank and Oil Pump;
- AOC-8: Above Ground Fuel Oil Storage Tanks;
- AOC-12: Cooling Water Discharge Tunnel;

- AOC-13: Former Wastewater Treatment Facility;
- Various exterior areas of Parcel B; and
- Groundwater monitoring wells (sampling of existing wells) at various locations across the Site.

HRP's evaluation of AOCs 7, 8, and 13, all located in the southwest portion of the Site, involved the drilling of twenty soil borings and the collection and laboratory analysis of 40 soil samples. Photoionization detector (PID) readings were detected in several soil samples ranging to 108.3 milligrams per kilogram (mg/kg), with the maximum reading detected at a depth of 13-15 ft bgs in soil boring SB-092914-109. Additionally, a sheen was observed at 8.5 to 10 ft bgs and 14 to 15 ft bgs in soil borings SB-093014-112 and -113, respectively. None of these soil samples exceeded ten times (10x) the groundwater protection criteria (GWPC) when analyzed using SPLP methodology.

2.3 Nature and Extent of Contamination

Weston & Sampson performed Site investigation between July and September 2017. The investigation included the collection of soil and sediment samples for laboratory analysis. The investigation was performed in accordance with TRC's Scope of Study (SOS), English Station, revised July 2017, which was reviewed by the CT DEEP. Please refer to **Figures 2 and 3** for the locations of the AOCs described below and **Tables 1 through 14** for a summary of soil analytical data.

2.3.1 Widespread Polluted Fill

On March 27, 2003, the CT DEEP issued "Approval of Widespread Polluted Fill Variance" for the Site based on an application prepared by AEI on behalf of QE. The application noted that the Site subsurface includes widespread polluted fill from historic dredging operations and that:

- Sediments impacted by historical industrial use along the Mill River had been used to construct Ball Island. Prior to 1886, there were sand bars present in the current location of Ball Island. The grades of these sand bars were raised enough to allow for commercial development of Ball Island after 1886. Grades were subsequently further raised to allow for construction of Station B on the northern portion of the Site in 1901 and subsequently, fill was placed on the southern portion of the Site to allow for construction of the English Station Power Generation Facility by 1935. Construction of final grades at the Site using sediments appears to have been completed by 1953.
- Sediments in the Mill River had been impacted by historical industrial operations which included coal gasification, storage and burning of coal in electrical generating facilities, metal processing, and lumber storage. These activities had impacted sediment within the Mill River with petroleum hydrocarbons and associated semivolatile organic chemicals, polynuclear aromatic hydrocarbons, and metals.
- These impacted sediments were used to construct Ball Island above the mean low water level in the Mill River.

Thus, soil impacted with metals, polynuclear aromatic hydrocarbons, and petroleum hydrocarbons that are believed to be present in the fill materials and not because of releases at the Site after the fill was placed are subject to the approved variance request. As such, the pollutant mobility criteria (PMC) are

not applicable to these chemicals. However, remediation to address direct exposure criteria (DEC) is still required.

Results of the Weston & Sampson Site Investigation and other historical investigations identified petroleum hydrocarbons, polynuclear aromatic hydrocarbons, and metals in soil Site-wide and that some of these analytical results exceeded remedial criteria (i.e., PMC and DEC). As polynuclear aromatic hydrocarbons and metals are ubiquitous in fill material at the Site, delineation of exceedances is not considered feasible. However, these impacts are more consistent and widespread on the north side of the site. On the south side, areas that were filled last, these impacts are not as widespread.

2.3.2 Parcel A and North Side of Parcel B Areas of Concern

The northern side of the Site contains AOC-1, AOC-2, AOC-5, AOC-6, AOC-12 (split into AOC-12E, 12W, and 12N), AOC-14 and AOC-15. Each AOC was previously investigated for soil, sediment, and porous media. Findings of the investigation for the above AOCs are provided below:

AOC-1 Station B

- Station B will be abated of hazardous building materials and then demolished during the performance of remedial activities at the Site.
- Analysis of soil samples beneath the structure identified arsenic at concentrations that exceed the I/C DEC and these impacts will be rendered inaccessible.

AOC-2 Station B Former UST Area

- Four petroleum USTs were previously removed from this area in 2002 and a remedial excavation was performed to remove impacted soil. Post excavation soil sampling identified petroleum impacts.
- Analysis of soil samples did not identify concentrations of petroleum hydrocarbons or VOCs above remedial criteria. PAHs were identified at concentrations above remedial criteria but are associated with Site-wide fill material.

AOC-5 Bulkhead PCB Remediation Area

- In 1998, oil-impacted soil was identified within this area after a section of the bulkhead constructed around the Site gave way. The bulkhead was repaired, and soil was excavated and removed.
- Weston & Sampson collected surficial soil samples to assess potential impacts from tracking. Deeper soil samples were collected from select boring locations to confirm the previous excavation was successful in removing impacted soil. Analysis of soil samples did not identify concentrations of petroleum hydrocarbons or PAHs above remedial criteria.

AOC-6 Capacitor Release/Outdoor Capacitor Banks 1-3

- Non-PCB impacts were not present in AOC-6.

AOC-12E

- AOC-12E (PCB Area 6.2) is located within the northeastern portion of the Site in an area

historically used for coal storage. Weston & Sampson performed investigation in an area where petroleum-impacted soil was previously identified and delineated these impacts.

AOC-12N Former Coal Storage

- AOC-12N is located south of Station B. Petroleum-impacted soil was identified in a historical soil boring within this area.
- Analysis of soil samples did not identify petroleum impacts above remedial criteria.
- PAHs and arsenic were detected above remedial criteria in two soil samples collected at depth and are associated with Site-wide fill.

AOC-12W

- ETPH concentrations that exceed applicable remedial criteria may be rendered inaccessible and no additional sampling or remediation will be required.
- PAHs and arsenic were detected above remedial criteria in multiple soil samples. The detected concentrations appear to be associated with Site-wide fill or former coal storage.

AOC-14 Cooling Water Tunnel

- AOC-14 consists of a former Cooling Water Discharge Tunnel that is located within the North Side of the Site. Weston & Samson performed sediment and porous media sampling in the tunnel every 10 feet, where accessible, to characterize potential impacts.
- Sediments were found to be impacted with petroleum hydrocarbons, PAHs and remediation is anticipated to mitigate these materials. Impacts to concrete were less than applicable remedial criteria and concrete can be left in place and rendered inaccessible.

AOC-15 Oil Stained Area North of English Station / Release to Catch Basin 4

- AOC-15 is located adjacent to and north of the English Station building. During demolition and asbestos abatement of the building in 2011 and 2012, spillage and subsequent tracking resulted in a large oil stain on pavement adjacent to the north side of the building. Catch Basin 4 is located within the oil stained area.
- Elevated concentrations of petroleum hydrocarbons were identified in two soil samples above remedial criteria, but these impacts are sufficiently delineated to plan remediation. PAHs were also detected above remedial criteria at one of these locations, but the PAHs are part of the impacted Site-wide fill.
- Analysis of a sediment sample collected from catch basin CB-4 identified arsenic and lead at concentrations above remedial criteria.

2.3.3 South Side Parcel B Remediation Areas

The southern side of the Site consists of AOC-3, AOC-7 through AOC-11 and AOC-13. Major findings of the investigation for the above AOCs are provided below:

AOC-3 Former Septic Systems

- AOC-3 includes two former septic system locations within the south side of the Site. Historic

maps depict the locations of the historic septic structures; one located on the western side of the Site (Septic West) and one along the eastern side of the Site (Septic East).

- Weston & Sampson advanced soil borings and collected porous media (concrete and asphalt) samples within the area of Septic West and East. Sediment samples were also collected within each structure. PAH and metal impacts to soil and sediments exceeding applicable remedial criteria were identified.

AOC-7 Former Waste Oil Aboveground Storage Tank (AST) / Oil Pump Room Area

- AOC-7 is located within the southeastern corner of the Site. A former waste oil AST was located adjacent to the southeastern corner of the English Station building. An oil pump house that serviced the building boiler system was also located in this area. Numerous soil borings were advanced throughout AOC-7. Porous media (concrete and asphalt) samples were also collected at boring locations and from concrete pads and pipe trenches. Sediment samples were also collected from manhole structures and pipe trenches.
- Historical and recent data have found evidence of ETPH releases to this area of the Site.

AOC-8 Former Fuel Oil ASTs

- AOC-8 is located within the southern portion of the Site. One 50,000-gallon No. 6 fuel oil AST was previously located within a concrete containment berm located in the far southern end of the Site. To the west of the former No. 6 fuel oil tank, there were two 5,000-gallon No. 2 fuel oil ASTs that were formerly located in concrete cradles.
- Weston & Sampson advanced soil borings, collected surficial soil samples, and porous media samples (concrete and asphalt) throughout AOC-8. Sediment samples were also collected from pipe trench and sump structures within the AOC. Petroleum hydrocarbon impacts were not identified in soil but identified in sediment.

AOC-9: Transformer Areas

- AOC-9 is located within the southwestern portion of the Site, to the west of the English Station building. Multiple historic transformers and capacitors were in this area. Numerous soil borings were advanced throughout AOC-9 and porous media (concrete and asphalt) samples were also collected at boring locations and from concrete pads and pipe trenches. Sediment samples were also collected from manhole structures and pipe trenches throughout the AOC.
- Historical and current data have identified releases of petroleum hydrocarbons from historical Site operations.

AOC -10 Former Interior Chemical Storage Areas

- AOC-10 is comprised of outbuildings located within the southwestern and southern portions of the Site associated with former interior chemical storage. Weston & Sampson advanced soil borings, collected numerous porous media (concrete) samples, and one sediment sample within AOC-10.
- Limited impacts to shallow soil beneath the buildings were identified.

AOC -11 On-Site Fill Material: Evaluation of Tracking

- AOC-11 is fill material located throughout the Site. The fill material has been adequately

characterized by others during previous investigatory efforts. This investigation included evaluation of tracking across pads/structures not captured by other AOCs. Weston & Sampson collected three porous media (concrete) samples from concrete pad structure P12 located in the southwestern portion of the Site. There was no sediment observed within the manholes of this structure and therefore, samples were not collected.

- Results of the investigation indicate surface concrete at structure P12 is not impacted. The data obtained from across the Site do not indicate that tracking of the COCs that are the focus of this RAP is an issue that needs to be addressed as part of the remedial actions.

AOC -13 Former Wastewater Treatment System

- AOC-13 is located within the southeastern portion of the Site, east of the English Station building and includes remnants of a former wastewater treatment system (primarily concrete pads). The operational history of this former treatment system is not well documented in historic reports. Weston & Sampson advanced soil borings and collected porous media samples (asphalt and concrete) throughout AOC-13. Sediment samples were also collected from pipe trenches in this area.
- Field screening of soil samples and results from the laboratory analysis of the soil samples indicate that releases of petroleum hydrocarbons have occurred during historical Site operations and these impacts will require remediation. Analysis of sediment samples identified ETPH in sediments collected from trenches likely from releases during historical Site operations.

2.4 Conceptual Site Model

Based on the review of Site history and investigations, Weston & Sampson has developed a Conceptual Site Model (CSM) for non-PCB Site impacts. The primary source for non-PCB impacts is the use of dredged sediments to construct Ball Island. To a more limited extent, releases from operations at the power plants (i.e., Station B and English Station) have also led to impacts at the Site. The nature and extent of these operations-related releases are summarized in the Weston & Sampson North Side Investigation Summary Report and the South Side Investigation Summary Report (Weston & Sampson, January 2018 and March 2018, respectively). The North Side Investigation Summary Report is attached electronically in Appendix A and the South Side Investigation Summary Report is attached electronically in Appendix B.

Soil sampling data was used to determine if a release to the environment occurred at the Site. As noted in Section 2.3, tracking of COCs was identified as a potential release mechanism at this Site, however, the results of sampling did not confirm this as an actual release mechanism. Non-PCB COCs were identified within specific areas of concern and are associated with specific releases or historical practices. Stormwater, cooling water and wastewater transported impacted soil/sediment within associated water conveyance structures (e.g., tunnels, trenches) was also determined to not be a current significant release mechanism because these water tunnels and trenches no longer discharge to the environment. Additional transport mechanisms, such as erosion from wind and precipitation were not found to be significant at the Site.

3.0 REMEDIAL ACTION PLAN

This section outlines the plans and procedures to be implemented for the remediation of COCs other than PCBs in soils at the Site. Planned non-PCB impacted soil remediation activities will be completed in accordance with the requirements of Connecticut's RSRs. Details regarding the remedial objectives, scope, and sequence of remediation are provided below.

3.1 Remedial Objectives and Approach

Remediation of PCB impacts will be completed and confirmed through the collection of confirmation samples in all areas to be remediated for other COCs at the site. Following the remediation of PCBs, the approach of the proposed remedial action for other COCs is:

- In areas where grades are to be maintained at current elevations, soil will be excavated to depths such that the impacted soil beneath will be rendered inaccessible following site restoration.
    - Excavated soil from excavations performed to address other COCs will be transported offsite for appropriate disposal.
- To maintain the asphalt paving and soil barriers in perpetuity, an environmental land use restriction (ELUR) will be applied to the barrier areas. The ELUR will also restrict future site use to industrial/commercial use.
- Barrier placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement will render soil exceeding the I/C DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32)(A) and (B). These barriers will be constructed over nearly all of Parcel A and the northern portion of Parcel B. Barriers will also be constructed over large portions of Parcel B.
- Petroleum impacts to soil that are likely from releases due to site operations will also be rendered inaccessible. When the petroleum impacts are found above the seasonal high water, which is approximately three feet below the ground surface over much of the site, and analytical results indicate that the GB PMC is also exceeded, additional excavation will be performed.

These remedial objectives will be achieved by the following approach detailed further in this report. The elements of the overall approach to remediation of soils at the Site include:

- Preparation of remedial plans and permits;
- Site preparation and establishment of temporary facilities, including Site security, signage and erosion and sedimentation controls;
- Excavation and off-Site disposal of non-PCB-impacted soil;
- Collection of verification soil samples for non-PCB-impacted soil, analysis to confirm the limits of soil remediation;
- Preparation of sub-grade by shaping the Site soils to provide a 2% grade for surface drainage;
- Construction of soil and soil/asphalt barriers to render soils inaccessible;
- Final restoration of soil excavation areas; and
- Recording ELURs on the land records.

This remedial plan focuses on the remediation of non-PCB-impacted areas only. PCB remedial actions to be performed at the Site are described in a separate plans to be executed prior to the implementation of non-PCB remedial actions.

3.2 Remedial Planning

The following sections summarize anticipated planning tasks to be performed prior to implementation of the remedial action.

3.2.1 Permits

The following permits and approvals from federal, state and local government agencies may be required for Site remediation and obtained by the remedial contractor:

- Connecticut Department of Energy & Environmental Protection (CTDEEP) General Permit for Discharge of Groundwater Remediation Wastewater Directly to Surface Water.
- CT DEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.
- Stormwater Pollution Control Plan
- City of New Haven Coastal Site Plan Review
- City of New Haven Building Permits.
- City of New Haven Demolition Permits.

Permit application signature pages for permit applications already submitted are included in Appendix C.

3.3 Public Notification

In accordance with the PCO and the RSRs, public notice for these activities is required. In accordance with CGS Section 22a-134a(i), TRC, on the behalf of UI, will provide public notice of the intent to remediate. The methods of public notice will include the following:

- Public notice will be published in a local newspaper having substantial circulation in the area affected by the Site.
- Notification will be issued to the director of the City of New Haven Health Department.

A sign will be erected on the Site (at least 30 days prior to the start of remediation activities) and contain the text prescribed in CGS Section 22a-133x. Proof of the published public notice and a picture of the sign posted is provided in Appendix D.

3.4 Site Preparation and Temporary Construction Controls

3.4.1 Site Security

Existing Site fencing will be maintained and access from Grand Avenue restricted to authorized personnel via gates. The existing fencing and island location of the Site will restrict access to the Site and limit trespassing. In areas where the steel bulkhead provides a shore barrier, no additional barriers are required. Repairs to the existing fencing and gates will be made before and during the construction

project, as needed.

3.4.2 Erosion and Sedimentation Controls

Erosion and sedimentation control measures will be implemented prior to any on-Site earthwork to prevent the migration of soils from the Site. The primary source of potential soil will be the stockpile(s) of impacted soil that will temporarily exist on-Site prior to on-Site relocation or off-Site shipment for disposal.

Stockpiles will be constructed in a manner to contain and secure the material and prevent contact of the stockpiled material with the ground beneath it or release of any stockpiled material to the surrounding area. Soils will be stockpiled on and covered by plastic sheeting, which will be anchored with sandbags or other materials to contain the soils and minimize potential exposure. Hay bales may be placed around areas used for stockpiling to prevent the migration of contaminated soil from the stockpile. The remedial contractor will also install and maintain catch basin protection to prevent sediment migration.

3.4.3 Dust Monitoring

Dust monitoring for total particulate emissions and fugitive dust within work areas and at the Site perimeter will be implemented during soil excavation and soil handling activities to reduce potential exposures to on- and off-Site receptors during remediation. Monitoring will be conducted continuously using real-time measurement equipment, and the results will be reviewed by the oversight engineer and remedial contractor to determine the extent of dust controls required. At a minimum, dust controls will include the use of windscreens on temporary fencing and use of polyethylene sheeting over temporary stockpiles. If necessary, active dust controls, such as wet spraying will also be deployed to reduce fugitive dust emissions and meet applicable National Ambient Air Quality Standards for particulate matter (PM).

3.4.4 Debris Removal

Areas of the Site requiring debris removal include areas of metal debris, wood debris, and a trailer. These materials will be relocated on-Site by the remediation contractor or appropriately disposed of/recycled. As appropriate, dust controls will be implemented during the movement of debris.

3.4.5 Clearing and Grubbing

Vegetation in remedial areas requiring removal will be cleared and grubbed by the remedial contractor. These areas are located along the East Branch Mill River and West Branch Mill River. The remedial contractor will remove of stumps and roots and properly dispose of these materials. The clearing and grubbing of PCB-impacted areas will be performed under separate RAPs and will be completed prior to the implementation of non-PCB remedial actions.

3.4.6 Remediation Sequencing

Non-PCB remediation work will proceed after the completion of remedial activities described in the PCB RAPs are completed. The non-PCB remediation work will be sequenced as follows:

a) Permitting and submittals;

b) Installation/repair of construction fencing, wind screens, signage, and erosion controls;
c) Temporary water, and if needed electric, utility service;
d) Dust controls and monitoring;
e) Debris removal and clearing and grubbing;
f) Excavation of non-PCB impacted soil with proper off-Site transport and disposal;
g) Subgrade shaping of polluted soils being rendered as "Inaccessible Soil";
h) Render polluted soil exceeding the I/C DEC as "Inaccessible Soil" in accordance with the provisions of 22a-133k-1(a)(32)(A) and (B) by placement of four feet of suitable soil or two feet of suitable soil beneath three inches of bituminous concrete pavement;
i) Site restoration and demobilization; and
j) Implementation of deed restriction (ELUR).

3.5 Soil Excavation

The remedial approach includes construction of soil and soil/asphalt barriers as described in Section 3.9. To achieve the proposed final elevations, shaping of the surface of polluted soil to remain will be performed to promote drainage. Excess soils will be generated that will be impacted with non-PCB COCs. All excess soil will be removed and disposed off-site.

The remedial contractor will characterize, transport and dispose of surplus soils at a permitted disposal receiving facility. Site soils requiring disposal will be accompanied with proper disposal documentation. Based on the excavation limits identified, remediation will require the removal of 23,500 cubic yards of non-PCB impacted soil to meet the elevations for barrier construction.

The soil and soil/asphalt barriers will include excavation and surface shaping to achieve sub-grade conditions above which the demarcation layer and soil and soil/asphalt barriers will be constructed. In the soil/asphalt barrier areas, the surface asphalt layer will be milled and disposed of/recycled off-Site and no asphalt/bituminous paving fragments will be allowed to be used or incorporated into fill on the Site. The subgrade of the soil/asphalt barrier will be 27 inches below final grades. To achieve this cut, excavation will be performed of on-Site soils. Please refer to Section 3.9.3 and Section 3.9.5 for details of the construction of the soil barrier and soil/asphalt barrier, respectively.

3.6 Post-Excavation Verification Sampling

Discrete soil samples will be collected from the excavations to evaluate whether the remaining soil complies with the remediation objectives. The soil samples will be collected from the excavation sidewalls at an approximate frequency of one sample per 20 linear feet of sidewall and every two feet of depth, with a minimum of one sample collected per sidewall. Soil samples will be submitted for arsenic, PAHs, and ETPH.

The engineer overseeing the remediation will field screen the soils for VOCs using a photoionization detector (PID) and inspect the soil for evidence of contamination. The soil samples will be collected into pre-preserved sample containers provided by the laboratory, stored in iced coolers, and transported via courier to the laboratory for analysis. The analytical laboratory selected for this project will be a State of Connecticut-certified public health laboratory. For quality assurance/quality control (QA/QC) purposes,

one trip blank per cooler and one duplicate soil sample per 20 samples will also be collected for laboratory analysis. To minimize risks associated with personnel entering open excavations, the soil samples will be collected using the bucket of the excavator or backhoe, as necessary.

3.7 Waste Management

Wastes generated during the implementation of this Partial RAP will be properly disposed of in accordance with applicable federal, state and local regulations. This section describes the anticipated non-PCB wastes.

3.7.1 Soil

Non-PCB-impacted soils will be excavated and those soils that cannot be relocated on-Site will be properly disposed of off-Site. These surplus soils will be characterized for the analytical parameters and at a sampling frequency required by permitted receiving facilities. The results of the waste characterization will be used to determine the proper receiving facility and disposal method. Disposal documentation (i.e., waste manifests) will accompany each truckload of surplus soil. Receiving facilities will return weight slips and disposal documentation which will be included in future reports to the CT DEEP.

3.7.2 Dewatering Effluent from Excavations

Groundwater depths at the Site range from 3 to 5 feet below ground surface. Depth of excavation may intercept the groundwater table and require dewatering. To manage dewatering fluids, the remedial contractor will pump dewatering fluids to fractionation tank(s) for treatment. Treatment and discharge will be in accordance with effluent standards set by CT DEEP for discharge to a surface water body. The remedial contractor will obtain a general permit for the discharge of groundwater remediation wastewater to a surface water body from CT DEEP. Based on analytical data, treated dewatering fluids meeting discharge limits will be discharged to surface water. Treated dewatering fluid discharges will be performed per the requirements of the discharge permit obtained from CT DEEP.

3.8 On-Site Soil Handling

Relocation of non-PCB polluted soil will not be permitted. Shaping and grading of polluted soil being rendered as “Inaccessible Soil” will be performed to establish the subgrade elevations needed to place soil and soil/asphalt barriers to the grades shown on the drawings and promote surface drainage. Once compaction and sub-grade elevations have been achieved, the remedial contractor will begin Site restoration tasks detailed in the next section.

3.9 Site Restoration

This section describes the remedial contractor’s Site restoration activities. These activities include installation of barrier components, backfilling excavations, and final surface restoration activities detailed below.

3.9.1 Installation of Demarcation Barriers

An orange demarcation layer will be applied to the soil and asphalt barrier areas. Orange demarcation

layers serve as a visual warning to potential future contractors indicating impacted soils are present at depth. The demarcation layer will serve as a barrier and will be documented in the ELUR (deed restriction). The orange demarcation layer will be placed above relocated/"native soils" and serve at the sub-grade elevation of the two barrier types.

3.9.2 Backfilling Excavations

Suitable soil fill material is needed to render underlying polluted soil inaccessible with either 4-feet of suitable soil or 2-feet of suitable soil with 3-inches of bituminous concrete pavement. The following discussion provides a description of the soil materials that will be deemed acceptable and the methods that will be used to ensure quality control for these soil materials.

Excavated areas below the groundwater table will be backfilled with Non-Polluted Soil only as specified herein to the average groundwater table elevation (approximately elevation 4 ft bgs) or as required by the Engineer. Fill and backfill above the groundwater table will be with Non-Polluted Soil and Natural Soil. Other soil materials used in Site restoration (e.g., screened soil materials, topsoil, gravel, crushed stone) will meet the gradation requirements in the technical specifications and chemical concentrations specified for Non-Polluted Soil.

The remediation contractor will be required to sample imported soil materials (i.e., Non-Polluted Soil or Natural Soil) and other soil materials to be used as specified in the Contract Documents (e.g., screened soil materials, topsoil, gravel, crushed stone.) that are proposed for use at the Site for chemical testing at a frequency of 1 sample per 500 cubic yards. Contractor will submit samples to an approved, independent laboratory certified by the Connecticut Department of Public Health for analysis for the following chemical parameters:

a. Petroleum hydrocarbons by the CT DEEP Extractable Total Petroleum Hydrocarbons (ETPH) Method;
b. Volatile organic compounds (VOCs) by EPA Method 8261;
c. Semi-volatile organic compounds (SVOCs) by EPA Method 8270;
d. RSR 15 metals by EPA Methods 6010 and 7471;
e. Pesticides by EPA Method 8081; and
f. PCBs by EPA Method 8082 with soil extraction by EPA Method 3540.

All analytical testing procedures will conform to Connecticut's Reasonable Confidence Protocols (RCPs) and the contractor's consultant will perform a Data Quality Assessment/Data Usability Evaluation as per CTDEEP requirements.

3.9.2.1 Non-Polluted Soil

Non-Polluted Soil shall be granular, well-graded friable soil; free of sediment, asphalt fragments, rubbish, debris, wood, glass, concrete, metal, bricks, ice, snow, tree stumps, roots, clay, organic matter and any non-soil deleterious material; with 25 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or three (3) inches, whichever is smaller. Soil material acceptable for use shall be classified as GM, GC, SM or SC according to the Unified Soil Classification System and shall have a plasticity index of less than 10.

Chemical properties for all soil materials must meet the following specifications for chemical concentrations to be classified as Non-Polluted Soil:

a. Soil defined as unconsolidated geologic material overlying bedrock, but not including sediment, and not affected by a release of a substance. A Release is defined as any discharge, spillage, uncontrolled loss, seepage, filtration, leakage, injection, escape, dumping, pumping, pouring, emitting, emptying, or disposal of a substance. A Substance is defined as an element, compound or material, which when added to air, water or soil or sediment may alter the physical, chemical, biological or characteristic of such air, water, soil or sediment. Sediment is defined as unconsolidated material occurring in a stream channel, estuarine waters, or marine waters. (Reference Connecticut Regulation of State Agencies 22a-133k-1(a) – Definitions)
b. No detectable concentrations of petroleum hydrocarbons as determined by CT DEEP ETPH Method with laboratory reporting limits less than the Analytical Detection Limit (ADL), Residential Direct Exposure Criteria (RDEC) and the GA PMC;
c. No detectable concentrations of VOCs by EPA Method 8260 with laboratory reporting limits less than the ADL, RDEC or the GA Pollutant Mobility Criteria (PMC) for each analyte;
d. No detectable concentrations of SVOCs by EPA Method 8270 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte;
e. Concentrations of RSR 15 metals by EPA Methods 6010 and 7471 less than the lower of the ADL, the High Range Background Concentration (see table below for metals concentrations) and the GA PMC by SPLP Method for each metal;
f. No detectable concentrations of pesticides by EPA Method 8081 with laboratory reporting limits less than the ADL, RDEC or the GA PMC for each analyte; and
g. No detectable concentrations of PCBs by EPA Method 8082 with laboratory reporting limits less than the ADL, RDEC or the GA PMC by SPLP Method.
h. The RDEC is the Residential Criteria provided in Appendix A and the GA, GAA Mobility Criteria (GA PMC) provided in Appendix B of the Regulations of Connecticut State Agencies, Section 22a-133k-1 through -3, inclusive.
i. Soil will be analyzed for each analyte for which an RDEC and GA PMC is provided.

Background Metals Concentrations

Metal	High Range Background Concentration (mg/kg)
Antimony	ND
Arsenic	5.4
Barium	800
Beryllium	3.5
Cadmium	0.3
Chromium	8.5
Copper	93
Lead	32
Mercury	0.08
Nickel	40
Selenium	49
Silver	0.83
Thallium	1
Vanadium	157
Zinc	130

ND – Not detected above laboratory reporting limits.

Source: Background concentrations for Connecticut Mesozoic Basin soils from Brown and Thomas, "Major and Trace Element Geochemistry and Background Concentrations for Soils in Connecticut," Northeastern Geoscience, Volume 32, 2014.

3.9.2.2 Natural Soil

Suitable fill listed as Natural Soil shall conform to the definition of Natural Soil as defined by the CTDEEP Solid Waste Regulations Section 22a-209-1, "Natural Soil" means soil in which all substances naturally occurring therein are presented in concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable. For the purpose of this definition, substance shall have the same meaning as in section 22a-133k-l of the Regulations of Connecticut State Agencies. Soil materials that do not meet the specifications for chemical concentrations to be classified as Non-Polluted Soil may be used onsite as Natural Soil as long as all of the metals conform to the following table that specifies the lower of the site background metals concentration and the RDEC. Metals must also conform to the GA PMC by SPLP method. In addition, all of the other substances (non-natural) must comply with the requirements of Non-Polluted Soil.

Natural Soil Metals Concentrations

Metal	Concentration (mg/kg)
Antimony	4
Arsenic	10
Barium	320
Beryllium	2.0
Cadmium	5
Chromium	72
Copper	760
Lead	400
Mercury	4
Nickel	70
Selenium	15
Silver	1
Thallium	5
Vanadium	390
Zinc	1,000

ND – Not detected above laboratory reporting limits.

Only non-polluted soil will be used to backfill excavations below the groundwater surface which averages approximately four ft bgs. All backfill materials will be placed and compacted in one-foot lifts and compaction to 90% of the modified proctor density will be required.

3.9.3 Construction of Soil Barriers

The area of soil barriers is depicted on Figures 6 and 7. The soil barrier will include four feet (48 inches) of tested and approved suitable soil above the orange demarcation layer and the underlying shaped polluted soil being rendered as “Inaccessible Soil”. The top six inches of the soil barrier will be loam. This loam layer will be seeded, and grass will be used to establish a vegetated turf layer. This turf, once established, will limit erosion.

The surface grade of the soil barrier will be graded to maintain a minimum of 12 inches of exposed steel bulkhead at the edge of the island. In this way, the soil barrier will be fully contained within the steel bulkhead and not overtop the bulkhead. The four-foot thick soil barrier will render the covered underlying polluted soils ”"Inaccessible Soil”.

3.9.4 Establishing Turf

As noted above, the soil barriers will be finished with a surface application of six inches of loam and seed to establish turf. Hydro-seeding of a seed mix suitable for the Connecticut climate will be applied

to the surface loam layer of the soil barriers. The turf root system will limit erosion of the soil barriers. Please refer to Figures 6 and 7 for a graphical depiction of the soil barrier areas to be finished with turf.

3.9.5 Soil/Asphalt Barrier

The remedial contractor will construct a soil/asphalt barrier in areas shown on Figures 6 and 7. As noted in Section 3.5, existing paving will be milled, and this material transported off-Site for proper disposal/recycling. Existing polluted soils will then be excavated to 27 inches below final paved elevations. The soil/asphalt barrier will then consist of the orange demarcation layer overlain by 24 inches of compacted, tested, and approved suitable soil overlain with the 3 inches of pavement. The 24 inches of soil will include approximately 15 inches of compacted sub-base overlain with 9 inches of compacted base material. The surface will include 3 inches of bituminous pavement. The soil/asphalt barrier will render underlying polluted soils, "Inaccessible Soil".

3.10 Equipment Decontamination

All materials and equipment used in the excavation of PCB-impacted soil will be decontaminated using appropriate procedures prior to use in the remediation of non-PCB impacted soil. Heavy equipment involved with the handling of non-PCB-impacted soil will be decontaminated prior to being removed from the Site. Solid wastes derived from excavation or decontamination will be placed with contaminated soil or containerized for appropriate off-Site disposal. Wash water from the decontamination of equipment will be collected and pumped to an on-Site temporary storage tank. The accumulated wash water will be sampled for disposal characterization analysis and transported and disposed of off-Site based on the characterization data, or alternatively, the water will be pumped to and treated through a temporary on-Site treatment system and discharged under a temporary dewatering permit (see Section 3.7.2).

3.11 Inspection and Monitoring Procedures During Construction

The excavation contractor will be required to keep daily logs of Site activities including estimates of the amount of soil moved during the day, as well as the personnel and equipment on-Site. The excavation contractor will submit copies of logs to the engineer overseeing the work at the beginning of each week. The contractor will provide the waste disposal documentation to the oversight engineer upon receipt.

The oversight engineer will maintain daily logs and photographic documentation of the activities conducted. Daily logs will document personnel present on-Site, general Site conditions at the beginning and end of the Site work conducted that day, inspection of erosion and sediment control measure, number of trucks loaded for disposal, and samples collected and sent to the laboratory. All documentation will be included in the final Remedial Action Report (RAR).

3.12 Post-Remediation Reporting

The remediation oversight engineer will prepare reports to document the implementation of this Partial RAP. The RAR will include a summary of completed remedial actions including volume of excess non-PCB-impacted soils and disposal documentation. The oversight engineer will summarize the confirmatory sampling activities and results. If expanded soil excavation activities were performed based on confirmatory sampling results, those details will be summarized in the RAR. The soil and soil/asphalt

barrier construction will also be documented. The oversight engineer will also note, if present, significant deviations from the proposed final grades in the RAR report.

4.0 LIMITATIONS

This Remedial Action Plan was prepared for the use of UI, exclusively. The findings provided by Weston & Sampson in this report are based solely on the information reported in this document. Future investigations, and/or information that was not available to Weston & Sampson at the time of the investigation, may result in a modification of the findings stated in this report.

Should additional information become available concerning this Site or neighboring properties which could directly impact the Site in the future, that information should be made available to Weston & Sampson for review so that, if necessary, conclusions presented in this report may be modified.

The conclusions of this report are based on Site conditions observed by Weston & Sampson personnel at the time of the investigation, information provided by UI, and samples collected and analyzed on the date shown or stated in this report. This report has been prepared in accordance with generally accepted engineering and geological practices. No other warranty, express or implied, is made.

5.0 REFERENCES

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FIGURES

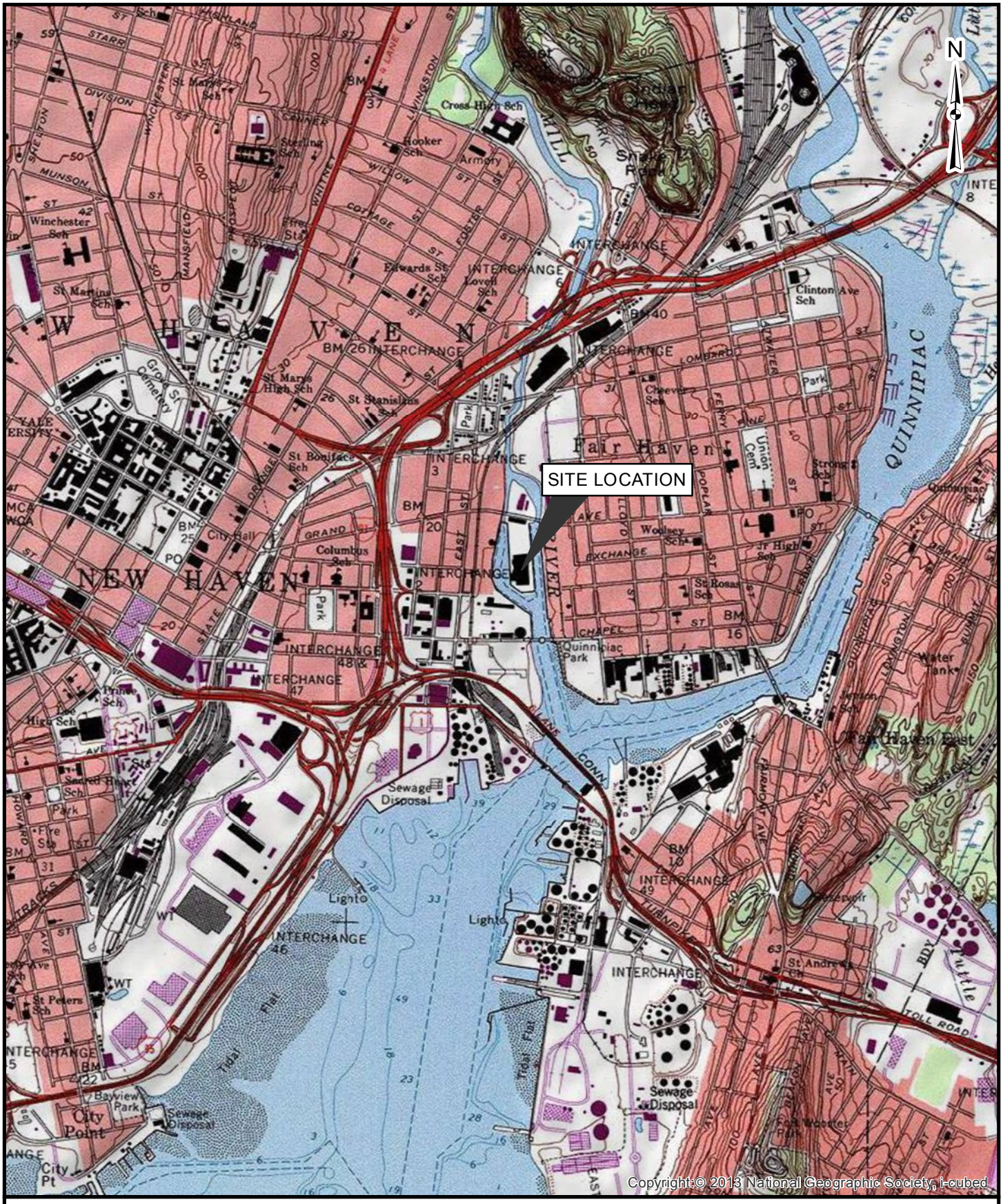

FIGURE 1
United Illuminating English Station Power Plant
510 Grand Avenue, New Haven, Connecticut

SITE LOCUS

2,000 0 2,000

Feet

Weston & Sampson